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# Journal

## OF THE AMERICAN VETERINARY MEDICAL ASSOCIATION

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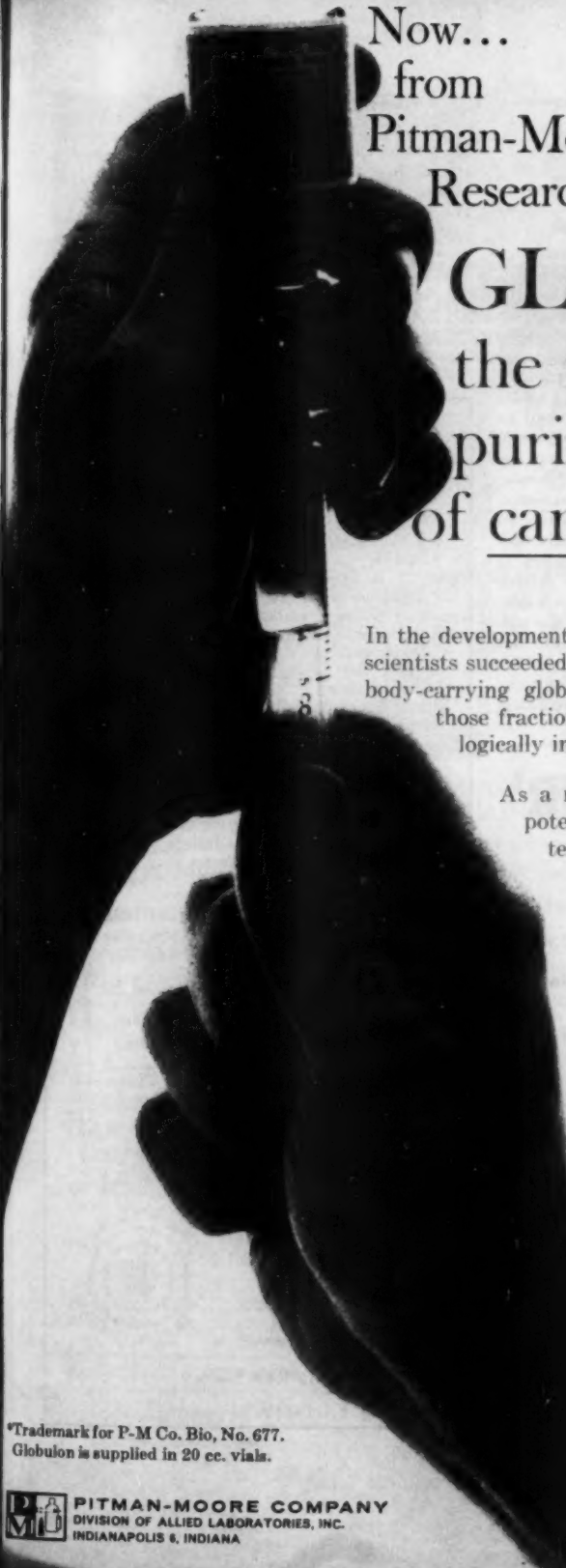
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## Correspondence

October 5, 1959

Dear Sir:

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We are not particularly interested that the cultures be fresh isolates; merely that they have not been serotyped previously. Although we would accept suspected tissues, we would prefer cultures on a solid medium. We would also accept cultures

which have not been identified completely but which are suspected of being *L. monocytogenes*. We would be grateful for a case history which is as complete as possible, and for as many different cultures from a single epizootic as can be obtained. The results of the serotyping will be sent to each laboratory submitting cultures and will also be retained in a permanent file here.

Sincerely yours,  
s/DR. M. L. GRAY  
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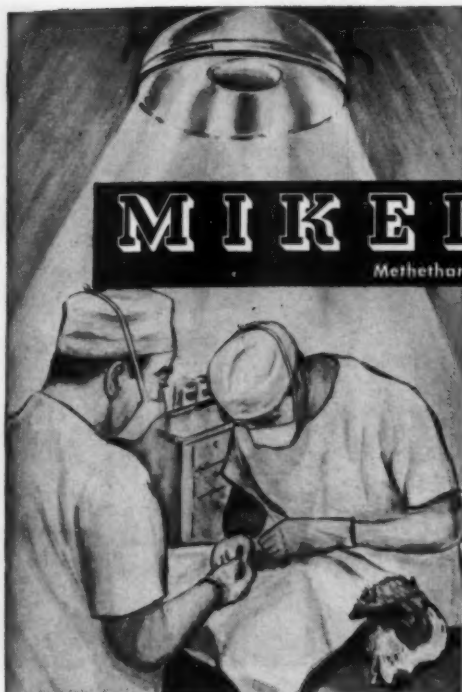
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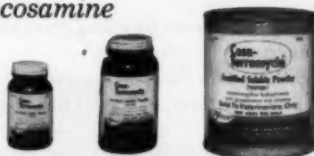
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**REFERENCES:** 1. Mosier, J. E., and Coles, E. H.: Vet. Med. 53:649 (Dec.) 1958. 2. Belloff, G. B.: Calif. Vet. 9:27 (Sept.-Oct.) 1956. 3. Mosier, J. E.: Vet. Med. 52:445 (Sept.) 1957.

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2nd Session, 86th Congress

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86-163, August 18, 1959 (S. 1289), to increase and extend the special milk program for children.

86-279, Sept. 16, 1959 (S. 1575), amends act of August 1, 1958, directing the secretary of interior to undertake continuing studies on effects of insecticides, herbicides, fungicides, and other pesticides upon fish and wildlife.

86-299, Sept. 21, 1959 (S. 2504) authorizes sale at current support prices of agricultural feed grain commodities by the Commodity Credit Corporation to provide feed for livestock in areas which are determined by the secretary of agriculture to be emergency areas.

86-341, Sept. 21, 1959 (H.R. 8609), extends the Agricultural Trade Development and Assistance Act of 1954.

86-305, Sept. 21, 1959 (H. J. Res. 531), establishes the second regular session of the 86th Congress to convene at noon, Wednesday, Jan. 6, 1960.

86-382, Sept. 28, 1959 (S. 2162), government employees health benefits program. Act becomes effective July 1, 1960.

S. 2575, Sen. Neuberger (D., Ore.) and 20 co-sponsors, to provide a health benefits program for certain retired employees of Government.

S. 2710, Sen. Johnson (D., Texas), and four co-sponsors, to provide for loan insurance on loans to students in higher education.

H.R. 9134, Rep. Carter (D., Iowa), to provide a new pension program for veterans of World War I.

H.R. 9287, Rep. Harris (D., Ark.), by request, to enable Department of H. E. W. and its various units to perform their functions more efficiently and effectively by providing certain administrative authority. Among provisions included are research and demonstrations, interchange of personnel with states, cooperation with other agencies in international activities, additional compensation for medical and dental specialists.

S. 2703, Senator Javits (R., N.Y.), would amend acts of July 31, 1894, and June 30, 1932, as amended, relating to em-

*(Continued on adv. p. 14)*



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## WASHINGTON NEWS—Continued

ployment and compensation of retired members of the armed forces in civilian offices or positions of the U.S. government. In effect, would authorize employment and pay under certain conditions when authorized by the Civil Service Commission, and when such employment is necessary or desirable in the public interest.

### Surplus Property to Organizations Abroad

S. 2725, Senator Humphrey (D., Minn.), amends Federal Property and Administrative Services Act of 1949, to permit the donation of surplus property to nonprofit organizations abroad engaged in education and health work.

### Proposed Amendments to Social Security Act

The following are bills by Senator Hart (D., Mich.): S. 2733, to amend the Social Security Act to increase old age, survivors, and disability benefits. Provides for an increase in tax on self-employed income and employer-employee tax, and would raise the tax base from present \$4,800 to \$6,000, on which social security tax is paid. S. 2734, to eliminate the requirement that an individual must have attained age 50 to become entitled to disability insurance benefits. S. 2735, to extend social security coverage to self-employed physicians. S. 2736, to provide for an additional "dropout" of low earnings in calculation of benefits under social security programs.

### MISCELLANEOUS

#### Col. McNellis Becomes Brigadier General

President Eisenhower promoted Colonel Russell McNellis, Chief of the Army Veterinary Corps, to the permanent grade of brigadier general (see JOURNAL, Oct. 1, 1959, adv. p. 24).

#### Dr. Clarkson New U.S.D.A. Associate Administrator

Dr. M. R. Clarkson (WSU '30) has been named associate administrator of the U. S. Department of Agriculture's Agricultural Research Service. As associate administrator, a new position in ARS, Dr. Clarkson will share with Dr. Byron T. Shaw, administrator of ARS, the broad authority and responsibility of coordination of all U.S.D.A. research as well as administration of research and ARS regulatory activities.



### The What and Why of a Swarming Bee

A substance, which may be a steroid, secreted by a tiny gland in the mandible of the queen bee seems responsible for the honey bee's peculiar way of life. The queen spreads this secretion over her entire body as she grooms herself, and then the worker bees, which are undeveloped females, surround the queen licking this "queen substance" from her body. This substance is quickly distributed to other workers as a result of a sharing of regurgitated food.

When the supply of the substance becomes inadequate or the queen bee dies, emergency queen cells are prepared and ovaries of the worker bees start to develop. When a new queen has been established, usually within two weeks, the ovaries of the other female (worker) bees revert to their rudimentary state. Thus the entire reproductive cycle of the bee colony is dominated by the supply of queen substance which, if it is a steroid, would be similar to sex hormones of higher animals.—*Sci. News Letter* (June 20, 1959): 391.

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1. Jones, S. V.; Belloff, G. B., and Roberts, H. D. B.: Vet. Med. 51:413 (Sept.) 1956.

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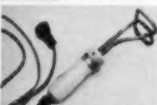
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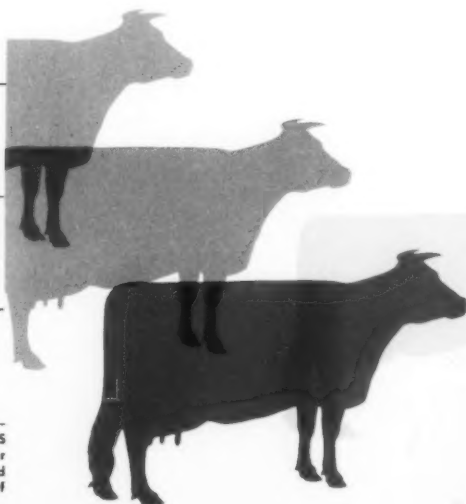
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Penicillin	Light Red	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid
Streptomycin	Light Red	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid
Neomycin	Light Red	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid
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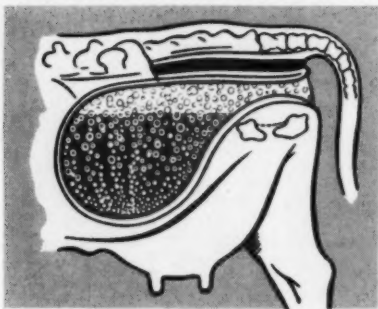
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## Eradicating Brucellosis from an Area Using Ring, Whey, and Blood Tests

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*Davis, California*

INVESTIGATIONS at the California Experiment Station<sup>1</sup> indicated that the whey test could be used in a brucellosis eradication program under conditions prevailing in that state. Because of this, the Animal Disease Eradication Division of the Agricultural Research Service authorized a pilot eradication program using ring, whey, and blood tests in Marin County, in cooperation with the California Division of Animal Industry and the University of California.

Marin is essentially a dairy county and is part of the San Francisco milkshed. Herds are large, maintained on hill pastures and, as a rule, replacements are raised on the ranch. Calfood vaccination, between the ages of 4 and 12 months, was practiced in California even before it became compulsory in 1947. Adult vaccination was uncommon in the area although it was practiced to some extent prior to 1956. There was no record of any organized blood-testing program having been conducted in the area. Most of the herds produce market milk using a pipeline operation to a bulk holding tank. The county was selected because of its proximity to laboratories of the Division of Animal Industry and the University of California, and because of its importance as a dairy county with husbandry practices typical of northern California.

### METHODS

Nondairy herds were blood tested in accordance with the uniform methods and rules. Dairy herds were ring tested (BRT). Lactating animals in BRT-suspicious herds were whey tested and dry cows blood

tested. Reactors to either test were branded and slaughtered. For research purposes, whey reactors were blood tested. Sixty days later, the herd was again ring tested and, if suspicious, the previous procedure was repeated. If the herd remained infected after four tests, using these procedures, the entire herd was subjected to the blood test and also a whey test on lactating cows.

*Interpretation of Blood and Whey Reactions.*—Blood test interpretations were in accordance with the official methods and rules recommended by the Animal Disease Eradication Division. Animals were considered calfood vaccinated only if the official California ear tattoo was visible.

The whey test was conducted on a composite milk sample from all four quarters. The plate technique was employed using 0.08, 0.04, 0.02, and 0.01 ml. of whey with a standard drop (0.03 ml.) of BRT antigen. Readings were made at 15 minutes. These amounts are referred to as whey titers 1, 2, 3, and 4 respectively. Any whey reaction complete at titer 1 or more was considered positive. This was contrary to a previous report<sup>2</sup> in which it was recommended that only titers 3 and 4 be considered positive, 2 as suspicious, and 1 negative. This change in interpretation was prompted by the investigation reported by Roepke et al.<sup>3</sup> in which it was indicated that the whey test was less effective than the blood test under Minnesota conditions.

When the program had been in operation for 14 months and the percentage of herd infection greatly reduced, it became apparent that too strict an interpretation of the whey reaction was being made. At this time, most of the low titer whey reactors were negative or suspicious to the

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TABLE 1—Summary of Progress in Marin County  
Whey Test Pilot Program

Classification	(No.)	(%)
Herds tested (all types) at least once	286	
Animals over 6 months of age	39,939	
Herds (all types infected on first test)	88	30.7
Animals infected	424	1.06
Dairy herds infected June 10, 1958	15	
Beef herds infected	2	
Total infected herds	17	6.0
Total infected animals	57	0.13
Dairy herds infected Oct. 1, 1958	8	
Beef herds infected	3	
Total infected herds	11	3.8
Total infected animals	35	0.08

blood test, and the number of shedders was insignificant. Consequently, a change was initiated in which the whey test was used as a screen on lactating cows in BRT-suspicious herds, and only those reacting to the blood test were branded as reactors.

Where a difference between blood and whey reactions occurred, the milk was examined for Brucella by guinea pig inoculation. It had been hoped to follow many of these animals to slaughter for culture of lymph nodes. This proved an impractical procedure and relatively few such examinations were made.

### RESULTS

Progress from the inception of the program in April, 1957, until Sept. 30, 1958, is summarized (table 1). The percentage of infection is now within the requirements for area certification. The data as of June 10 are presented because it was at this period, due to the strict interpretation of whey titers resulting in a number of positive reactions in blood test-negative animals, that problem herds became ap-

parent, and the program was modified as described.

A comparison of blood and whey reactions with the Brucella-shedding condition of cows is shown, covering a period of 14 months from the beginning of the program (table 2). A highly significant number of animals reacting at whey titer 1 and 2 were only negative or suspicious to the blood test. These animals had been branded and slaughtered, yet only an insignificant number were shown to be infected by inoculation of their milk into guinea pigs. These data led to the modification of the program in which only whey reactors that were positive to the blood test were branded.

It is of interest that of 69 cows that were suspicious on the blood test and positive on the whey test, 17 (24.6%) were shedding Brucella in the milk. At whey titers 3 and 4 (blood suspicious), there were 14 shedders (28%) of 50 inoculated. Data compiled subsequent to the period shown in table 2 did not show any significant change in percentages.

Data from prior investigations as well as from Marin County are tabulated, including the vaccination status of the animals, a comparison of blood and whey reactions, and the Brucella shedding condition (table 3). Here again whey titers 1 and 2 have been separated from 3 and 4 to indicate the low incidence of infection at the former titers. Of interest, however, is the equal distribution of shedders in calfhod-vaccinated and nonvaccinated cows, except in blood suspects at whey titers 3 and 4 (see discussion).

The percentage herd infection at the various retests is calculated on the basis of the original method and also on the basis of the modified method (table 4). Using the original method, it took four rounds of retesting of infected herds before the percentage of reactors was below five. In the modified method, this achievement was attained on the third test. Again, this indicated the sensitive nature of the whey test.

### DISCUSSION

The investigations in Marin County have substantiated the fact that the whey test has a potential role in a bovine brucellosis eradication program. Herd infection, using a combination of ring, whey, and blood tests, has been reduced from 30.4 to less

TABLE 2—A Comparison of Reactions to the Blood and Whey Tests and the Brucella-Shedding Condition of Branded Cows

Blood	Inoc.*	Shedder**
Whey titers 3 and 4		
Neg.	49 (13.6%)	24 (8.3%)
Susp.	90 (25.1%)	50 (28%)
Pos.	220 (61.3%)	11 (54.5%)
	359	
Whey titers 1 and 2		
Neg.	55 (39.3%)	28 (1)
Susp.	61 (43.6%)	19 (3)
Pos.	24 (17.1%)	7 (0)
	140	

\*Inoc. = No. of milk samples inoculated into guinea pigs; \*\*shedder = No. and percentage of cows shedding Brucella.

TABLE 3—A Comparison of Blood and Whey Titers Versus the Brucella-Shedding Condition of Vaccinated and Nonvaccinated Cows

Blood	Whey titers 1 and 2				Whey titers 3 and 4				Totals	
		Inoc.* Shed.**			Inoc.	Shed.			Inoc.	Shed.
Neg.	CV†	31	1	CV	23	3			54	4
	NV‡	8	0	NV	9	1			17	1
Susp.	CV	37	3	CV	50	21	42.0%		87	24
	NV	12	1	NV	21	4	19.0%		33	5
Pos.	CV	9	0	CV	59	47	79.6%		68	47
	NV	15	1	NV	88	71	80.6%		103	72
Totals		112	6		250	147	58.8%		362	153

\*Inoculations made; \*\*cows shedding Brucella; †calfhood vaccinated; ‡nonvaccinated.

than 3.8 per cent. Cattle infection has been reduced from 1.06 to 0.08 per cent. The data also pays tribute to the effectiveness of strain 19 vaccine in reducing the incidence of cattle infection in an area where no other program was in effect.

It is also apparent, however, that the vaccinated exposed animal is quite capable of becoming a carrier of virulent *Brucella abortus* in the udder (table 3). The incidence of shedders was about equally divided between animals that had been officially calfhood vaccinated and those that had not. The exception was found in the group that were suspicious on the blood test and reacting at whey titers 3 and 4 (table 3), in which the percentage of Brucella shedders was much higher in the calfhood vaccinated animals. This could be explained on the basis that many of the blood test suspects had incomplete titers at 1:200; conceivably, in some laboratories many of these could be called positive. It could also be attributed to the difference in interpretation of the blood test in vaccinated and nonvaccinated animals.

The investigations showed conclusively that the whey test, as used in Marin County, was extremely sensitive and that the interpretation of whey titers was much too severe. Of the animals with whey titers 1 and 2, 79.3 per cent were serologically negative or suspicious. Only four of 47 milk samples were shown by inoculation to contain *Br. abortus*. Of cows with whey titers 3 and 4, 13.6 per cent were serologically negative, 25.1 per cent were suspicious, and 61.3 per cent were positive. In the blood test-suspicious group, 14 of 50 milk samples (28%) were shown by guinea pig inoculation to contain *Br. abortus* (table 2).

As a result of this finding, the program was modified and no reactor to the whey

test was branded unless it was also serologically positive. This modification was well justified in cows with whey titers 1 and 2. In cows with titers 3 and 4, a significant number were infected yet would have remained in the herd as blood test suspicious. This would have delayed certification, left herds BRT suspicious, but would not have been likely to contribute to further spread of infection in a vaccinated herd. To nonvaccinated animals they would be a dangerous reservoir of infection. Removal of animals with whey titers 3 and over would materially speed eradication, the ultimate goal.

False-positive whey titers may be due to testing within four days after calving. Some may be due to the transfer of blood agglutinins in the suspicious range to the milk in an inflamed udder even if the gross appearance of the milk is normal. Criticism of the whey test has been expressed in the belief that some infected animals would not be detected. Yet, in Marin County, more animals were removed by the whey test than would have been removed by the blood test. The chief criticism of the test, as used in this program, was the extreme sensitivity. For this reason, the whey test is now being used as a screen test in BRT-suspicious herds. A program such as this would limit the amount of bleeding to the dry cows and to a small percentage of lactating animals. In certain heavily populated dairy sections of California, the

TABLE 4—The Percentage of Brucellosis in Herds on Various Retests

Method	Tests			
	First	Second	Third	Fourth
1*	30.5 %	15.5 %	9.6 %	4.86 %
2**	28.12 %	10.06 %	4.80 %	3.81 %

\*Original method in which all reactors to the whey test were branded; \*\*modified method in which reactors to the whey test were branded only if positive to the blood test.

number of dry cows is negligible. Lack of pastures in such areas prohibit the maintaining of anything but lactating animals.

Because of the research aspect, the program made slow progress. In the beginning, the collecting of BRT samples was time consuming because most of the milking was a pipeline operation to a bulk tank and the original ring tests were made on a composite sample from 15 cows. Later, this test was modified to recognize a composite from up to 150 cows, collected at the holding tank. The research aspect of the program made necessary a second visit to the herd to obtain additional milk samples for bacteriologic examination. Herd infection, however, was reduced from 30.4 per cent on the original round of testing to 15.5 on the second, and 9.6 on the third.

Progress was again slow when the herd infection was down to approximately 7 per cent. At this period, just prior to the modification of the methods, low whey titers in animals negative or suspicious to blood tests prevented a further reduction in herd infection. Upon modification, the percentage of reactors was rapidly reduced to below that required for area certification. Thus it is clear that the whey test can be incorporated into the brucellosis eradication program, especially in heavily populated dairy sections.

## CONCLUSIONS

The whey test for brucellosis, as interpreted in Marin County, was extremely sensitive, especially at titers 1 and 2, and resulted in the removal of noninfected animals. Whey reactions can be confirmed by blood test. In blood test positive-animals with whey titers of 3 and 4, there was no significant difference, between vaccinated and nonvaccinated animals, in the percentage which shed *Brucella* in their milk. In blood test-suspicious animals with whey titers 3 and 4, a significant number were shedding virulent *Brucella abortus*.

The whey test can be effectively combined with the BRT and blood tests in an area eradication program. It can be of great value in detecting the infected animal that is suspicious to the blood test and, under present conditions, is permitted to remain in the herd.

## References

- <sup>1</sup>Cameron, H. S.: A Comparison of Blood and Whey Brucellosis Tests on 20,000 Cows. J.A.V.M.A., 130, (1957): 130-134.
- <sup>2</sup>Cameron, H. S.: The Interpretation of Whey Titers in the Diagnosis of Brucellosis. J.A.V.M.A., 129, (1956): 581-582.
- <sup>3</sup>Roepke, M. H., Stiles, F. C., White, T. G., and Driver, F. C.: A Study of the Whey Plate Agglutination Test for Brucellosis. J.A.V.M.A., 131, (1957): 170-173.

## California Requires Brucellosis Vaccination for Imported Heifers

Starting in January, 1961, all female dairy cattle over 4 months old brought into California, except for slaughter, must bear evidence of official vaccination against brucellosis between the ages of 4 and 12 months.—*Am. Cattle Producer* (Aug., 1959): 17.

## Viability of *Brucella abortus*

When various tools in a cow stable were moistened with *Brucella*-containing milk from infected cows, the life of the *Brucella* organisms was considerably longer when the articles were contaminated with feces than when they were sterile. With fir wood, the organisms were viable five days or 14 days, and with beech tree wood, six days or ten days, respectively, depending on whether the instrument had been originally

sterile or contaminated. Yes. With flannel cloth, the viability was six days or 16 days, respectively. The organism lived 29 days on sterile straw and 31 days on feces-contaminated straw. Viability was three days on hairy skin and two and a half days on on hairy skin and two and one-half days on *Vet.-med.*, 12, (1959): 162.

## Ovine Brucellosis

*Brucella ovis*, a newly identified organism, has been found to cause genital disease of sheep in New Zealand (where it is widespread), Australia, and the United States. Active infection is more persistent in rams than in ewes. It causes infertility in rams and readily spreads throughout the group when rams are confined and separated from the ewes.

A high degree of protection for rams against field infection can be produced by simultaneous inoculation with strain 19

vaccine and an adjuvant vaccine incorporating dead *Br. ovis* organisms.—*M. B. Buddle in Off. internat. des Epizoot.*, 52, (May, 1959): 328.

### Livestock Economics

*California Plans Big Swine Increase.*—Several large associations, including the California Veterinary Medical Association, met recently to plan for an increase in swine production from about 335 thousand to 5 or 6 million hogs annually. This is considered feasible because of the favorable climate, abundant feed supply, available packing facilities, and sufficient population to consume the finished product. The movement was triggered partly by a revision of westbound freight rates making it uneconomical to import live hogs from the midwest.

To offset higher production costs, it was recommended that a premium of about \$1.50 per hundredweight be paid for locally raised hogs of the right size and quality. It was proposed that there be 4,000 production units of 100 sows each, raising 8 pigs per litter twice a year, which would produce 6 million hogs. This would mean an average of 200 units per county for the more than 20 California counties best adapted to swine raising.—*Nat. Hog Farmer* (Sept., 1959): 11.

*Hog Price Support Bills Introduced in Congress.*—In an attempt to reduce pork supplies, bills were introduced in both houses of Congress which would provide incentive payments of \$1 to \$3 per 100 lb. to farmers marketing swine at 180 to 200 lb. so that they would receive not less than \$14 per hundred. Support prices would not be available to those raising swine on an integrated plan, to farmers producing hogs under contract with prospective purchasers or feed suppliers, or to producers with a total income of more than \$5,000 from off-farm sources. In any one year, no producer could receive incentive payments over \$3,500 and the total of incentive payments made could not exceed \$150 million.—*Nat. Hog Farmer* (Sept., 1959): 42.

*World Pork Production Rising.*—In 1958, world pork production totaled 38.7 billion lb., 4 per cent greater than in 1957 and 19 per cent greater than the 1951-55, average. The greatest increases were in Europe,

Russia, and Canada.—*Nat. Hog Farmer* (Sept., 1959): 29.

### Insecticide Residues in Milk and Milk Products

*Insecticide Residues in Milk from Dairy Cattle Fed Treated Crops.*—When feed crops treated with chlorinated hydrocarbon insecticides were fed to dairy cattle, residues of benzene hexachloride, chlordane, DDT, dieldrin, endrin, and toxaphene appeared in the milk. Aldrin, heptachlor, and methoxychlor were not detected in significant amounts. Maximum levels of insecticide present in milk range from 26.0 p.p.m. for DDT to 0.05 p.p.m. for endrin.

Residues of organic phosphate insecticides also occur on feeds and hence are ingested by dairy cattle; however, they generally do not appear in milk. It is believed that the insecticides are broken down in the rumen.—*J. Milk and Food Tech.*, 22, (May, 1959): 145-149.

*Insecticide Residues in Dairy Products, and Associated Problems.*—Surveys of market milk supplies have shown that 25 to 62 per cent of the samples contained traces or larger amounts of chlorinated hydrocarbon insecticides. Benzene hexachloride and DDT were found most frequently. Organic phosphate insecticides were not found in samples tested.

Highest concentrations of chlorinated hydrocarbon insecticides were found in high-fat dairy products such as butter, cream, and cheddar cheese.

DDT and other chlorinated hydrocarbon insecticides were found to be intoxicating when ingested in high concentrations and some may bring about chronic intoxication if ingested at low levels over long periods. DDT was stored in the fatty tissues of man, other mammals, and birds after ingestion. Some people were hypersensitive to DDT.

Organic phosphate insecticides were found to vary from high to moderately low in their toxicity to man. Milk generally did not contain these insecticides and hence only gross misuse would result in the presence of toxic levels in dairy products.

The Food and Drug Administration has set tolerance levels for DDT, methoxychlor, and malathion in milk at zero p.p.m.—*J. Milk and Food Tech.*, 22, (June, 1959): 179-182.

# The Global Picture of Animal Disease

SIR THOMAS DALLING

*Rome, Italy*

NO ATTEMPT will be made in this paper to discuss details of the distribution of diseases of livestock. Such details are contained in the FAO/OIE "Animal Health Year Book," published by FAO annually, and are compiled from information received from the countries. The objective of the paper is to discuss the general subject of distribution of animal diseases with special reference to spread into new areas or countries and the steps being taken toward control and eradication of some diseases of economic importance.

While some diseases probably will remain confined to certain parts of the world because of unfavorable conditions for the survival of the causal agents, many of the infectious diseases do spread, following introduction into a new area. Again, through the control measures now being adopted, some of the diseases which at one time caused much economic loss have been completely eradicated from countries and almost from whole continents. There has, therefore, been a steady change which will continue to occur in the global picture of animal diseases.

The control of animal diseases is carried out largely from an economic viewpoint, which applies to both the individual animal owner and the country itself. The presence of disease means fewer productive animals or delays in production, with a consequent lowering of animal production in general, higher costs of food of animal origin in a country, and interference with the maintenance and further development of a livestock industry from which a country may expect to increase its economy. We must not forget, in addition, the part played by the zoonoses in interfering with the human work capacity and with the contentment and happiness of mankind in general.

The changes in the global picture of disease may be considered from two angles: (1) the lowering of incidence, leading even-

tually, it is hoped, to total eradication from an area; and (2) the spread of specific diseases into new areas where, sometimes, because of the high susceptibility of the particular species of livestock, extensive outbreaks may occur.

## LOWERING INCIDENCE OF DISEASE

There are several causes for lowering incidence of a specific disease. They include the reduction in the numbers of a species, a better understanding of the causal agent, precautions to minimize the risk of the introduction of a disease into an area, improved methods of diagnosis, the practice of more modern methods of control, and the operation of eradication schemes on a large scale by state veterinary services following, sometimes, forceful expressions of public opinion.

In almost all parts of the world, glanders in the equine species is either entirely absent or is gradually disappearing. The replacement of the species by mechanical equipment has a bearing on this incidence; but even in other areas glanders is now comparatively rare.

Rinderpest (the cattle plague), which was eradicated many years ago from some areas, is still causing losses, especially in eastern and southeastern areas but even there the incidence is reduced. The extensive epizootics of rinderpest seldom occur today.

Planned schemes of control are essential in these infected regions leading toward complete and final eradication. Such schemes must, however, embrace large areas, sometimes involving a number of countries. The value of extensive schemes is evident in India where, after a comparatively short application, it is stated that the southern part of the subcontinent is now entirely free from rinderpest. Unfortunately, the infection still persists in some of the neighboring countries and invasion across the frontier sometimes occurs; further intensive work has always resulted in again eradicating the infection. Now that safe and efficient vaccines are available, even for the most highly

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susceptible animals, and the epizootiology of the disease is better understood, it would seem that with the application of control schemes involving, if necessary, groups of countries, the way is clear for the eventual eradication of rinderpest from the world.

True shipping fever (hemorrhagic septicemia) caused by *Pasteurella multocida* Roberts (type I) no longer causes the heavy losses experienced in past years in some regions. In most Near East countries where, at one time, the disease was widespread, it is now confined to parts of infected countries or occurs only sporadically. In some of the Far East countries, although the disease continues to be widespread, it is gradually being brought under control by the use of improved vaccines.

The interesting studies of the toxins of some of the anaerobic organisms, and the conditions under which they are produced in the alimentary tract of ruminants, have led to a better understanding of preventive measures, including the use of efficient vaccines in controlling the infections. In addition to the value of the knowledge on the toxins themselves, the use of adsorbed anatoxins and anacultures has proved valuable in reducing incidence and mortality.

With artificial insemination as a method of breeding, the role of some infectious agents as causes of infertility became more evident. Chief among these agents were trichomonads and vibrios. When tests were devised for the recognition of these infections, they were found to occur in many countries. Experience has shown how herd and breeding management can eliminate the causal agents in infected females, and the results of research work indicate lines of treatment for infected males. These have resulted in a lower incidence of these diseases in countries where the infections have been heavy.

The various parasitic infections of the gastrointestinal and respiratory tracts continue to be causes, often "hidden," of lowered animal production. Studies of the life cycles of the causal parasites are leading to better information on some aspects of animal husbandry and management which influence the completion and the breaking of the respective life cycles; anthelmintics, properly used, are beneficial

in the control of some helminths of the alimentary tract. Recent research on the establishment of immunity for some parasites of the respiratory tract will, it is hoped, go a considerable way in controlling some types of parasites, as causal agents of parasitic bronchitis. There is also evidence that immunity against some of the gastrointestinal helminths may be a method of control.

For years, little was known about types of *Leptospira* responsible for diseases of animals. It is well within the memory of most of us that much of our information concerned leptospirosis of the dog. Research has shown the existence of numerous species in other animals and techniques for their differentiation have been developed. With the recognition of such infective agents and a study of the conditions suitable for their existence and multiplication, methods have been found for their control, resulting in a lowered incidence in some areas.

In the past few years, rapid strides have been made in control and eradication of bovine tuberculosis in some countries in which the incidence has been high. The better understanding of the use of tuberculin, applied intradermally, and the interpretation of the results is proving highly efficient in diagnosing infection by *Mycobacterium tuberculosis* var. *bovis*. So-called "nonspecific" reactions from tuberculin sensitivity arising from other causes does, on occasion, give rise to some confusion in eradication schemes: the simultaneous use of tuberculin of mammalian and avian origin, especially standardized, and a comparison of the reactions are of considerable value in concluding whether reactions are caused by *Myco. tuberculosis bovis* or other sensitizing agents. Further research is needed to determine the nature of tuberculin sensitivity in the absence of any already recognized microbiological agent. Such reactions tend to be more in evidence in some herds than in others and are particularly observed toward the final stages of eradication. It has been definitely stated that vaccination against bovine tuberculosis in animals is not a feasible control or eradication measure.

Recently considerable progress has also been made in the control of brucellosis in cattle. The introduction of the ABR

milk test has enabled rapid examination to be made of herd infections, while the standardization of antiserum and antigen and rules for interpretation of the results of agglutination tests have assisted considerably in determining the presence or absence of the infection in individual animals.

The practice of artificial insemination has made clear the need to eliminate the infection from breeding bulls. Much success throughout the world has followed the administration of live attenuated *Brucella abortus* vaccines in the control of brucellosis in cattle. *Brucella abortus* strain 19 vaccine is used in many countries. As yet, there is not available for general use vaccines to control *Brucella melitensis* infection in goats and sheep. Research indicates that vaccine with a base of killed virulent *Br. melitensis* or an attenuated culture of the organism may be that of choice for field control work. The disease in sheep and goats continues to cause considerable losses.

#### SREAD OF INFECTIONS

Some diseases appear to spread within a country or area and to invade other parts, sometimes at long distances from other infected places. It may be that some are now being recognized for the first time in an area because of the application of better diagnostic methods. The importation of infected animals and products of animal origin plays a considerable part in such new spread. The introduction of an infection into countries which are free is, however, minimized to a marked degree by the enactment of legislative measures controlling such imports. Two recent examples, which occurred in spite of careful vigilance, are the appearance of bluetongue in Portugal and Spain and of African swine fever in Portugal. The early recognition and confirmation of these diseases, with the application of control measures, resulted in the prevention of spread into other countries. Another example is the introduction of scrapie in sheep into the western hemisphere.

The fear of the spread of foot-and-mouth disease into countries now free from the disease is ever present and necessitates the application of severe measures in many countries to prevent its introduction. Suggestions have been made for rigid regula-

tions, internationally, to which all countries would conform on export and import requirements for livestock and products of animal origin. The multiplicity of the types of the virus of foot-and-mouth disease complicates control of the disease considerably except in countries which adopt an out-and-out slaughter policy. The three classical types O, A, and C with variants within the types, the three African types SAT 1, SAT 2 and SAT 3, and the recently diagnosed Asia 1 all with their relatively independent antigenic characteristics, may be even more widespread than is at present realized. The true position can be ascertained only by continuous typing of samples of the virus from outbreaks throughout the world. International collaboration is necessary in controlling the disease. To this end, a beginning has been made for regional control by the setting up of the European Commission for the Control of Foot-and-Mouth Disease by FAO at the request of governments. It is hoped that foot-and-mouth disease will be finally eradicated from Europe, and that measures will be applied whereby the risk of reintroduction from any part of the world will be small. While a slaughter policy is adopted in some countries, vaccination of the entire cattle population or that in vulnerable areas or in prescribed areas surrounding outbreaks forms the basis of control in most of the countries in Europe. We look forward to the results of the laboratory and field trials of the newer types of vaccine which, if successful, will encourage the adoption of more extensive schemes of vaccination in different parts of the world.

Swine fever (hog cholera) is enzootic in some countries and continues to spread within and outside infected areas. In such countries, control difficulties are largely associated with the movement of swine and the distribution of products from infected animals. There are many examples of the introduction of swine fever into countries free from the disease. Its early recognition and drastic control methods have usually resulted in its total eradication and freedom from the disease until a further introduction takes place. The use of the more recently introduced immunizing agents, with or without the simultaneous injection of hyperimmune serum, should assist in controlling the infection. The evidence of



antigenically different strains of the causal virus, if they are found to be widespread, may add to the difficulties of control and eradication.

In considering the spread or increase in incidence of disease, mention has to be made of risks which attend agricultural development, especially in less developed areas. The importation of animals from different parts of the world may mean some risk in introducing specific diseases which, if not diagnosed and dealt with early, may spread among the native stock; there are records of such happenings, in spite of certification that the imported animals have satisfactorily passed diagnostic tests before export. In connection with irrigation schemes which are now being developed in different parts of the world, there is the likelihood of an increase in parasitism, e.g., distomatosis, arising from conditions made suitable for maintaining the life cycles of the specific parasites.

Spread of disease may also be related to the extension of areas suitable for maintenance of vectors, e.g., ticks and insects.

With animal production increased to meet world needs, intensive methods of breeding and raising animals have created opportunities for rapid spread of diseases, especially those of the respiratory and intestinal tracts. Much is known today about the cause and control of Newcastle (Ramikhet) disease and effective methods developed to prevent its occurrence. In some parts of the world, the results have been spectacular and have resulted in revival of the industry which, at one time, was at a low ebb. The finding of strains of the causal virus, attenuated in character, their cultivation in developing chicken embryos, and their effective and safe use in young chicks have helped develop satisfactory immunity. The simultaneous use of such virus and a naturally attenuated virus of fowlpox in chicks has also been successful. We have yet to obtain, however, a clear picture of the group of infections of the respiratory tract of fowl and the causes. Coccidiosis can now be controlled by use of medicated feed.

In many parts of the world, satisfactory animal production is almost impossible, because of deficiencies in the soil and pastures of some of the essential minor elements. In determining causes of low production, attention must also be given

to the occurrence of excesses of some of these elements. With judicious treatment, some pastures may be restored.

#### CONCLUSION

It is difficult to assess the over-all position of animal health and disease throughout the world today. There has been some improvement: most of the dangerous epizootics have been successfully eradicated from some areas, while the incidence is regressing in others: better methods for diagnosis are now available and more satisfactory, cheaper and more easily applied immunizing agents are available. The tendency for international collaboration will result in technical assistance for the study and application of control measures. More attention by the respective authorities is being given to the control of zoonoses, the reservoir of which is largely infected animals. Careful attention is being given to the conditions under which livestock and products of animal origin are imported into countries. Governments realize the importance of improved animal production and the part played by veterinary services in problems of animal health and disease and are increasing facilities to assist in veterinary activities.

The veterinary profession throughout the world is surely giving a good account of itself—and, using its knowledge and the facilities now at its command will, as time progresses, succeed in changing considerably the global picture of animal diseases by the continued improvement of animal health.

#### Effect of Protein Diet and Susceptibility to Bacterial Infections

Young mice on diets of pellets containing various qualities and quantities of protein and amino acids were inoculated intravenously with *Staphylococcus aureus*, *Mycobacterium tuberculosis*, and *M. fortuitum*. Those fed 8 per cent casein plus 12 per cent of a mixture of essential amino acids were most resistant, next were those fed 20 per cent casein, followed by those fed 8 per cent casein, with those fed a 21 per cent crude protein ration being the most susceptible. Their resistance to infection paralleled their weight gains.—*Vet. Bull. (June, 1959): Item 1721.*

## A History of Anthrax

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A MAJOR TURNING point in the history of medicine began with research on anthrax. The historical significance of anthrax is threefold: (1) It was the first disease of man and animals shown to be caused by a microorganism; (2) the first disease for which the principle of a bacterial vaccine was found effective and practical; and (3) the disease on which much of the original work on bacteriology was done and from which many well-known principles of microbiology were derived.

It is not likely that anthrax was known to primitive man, at least until he became agrarian in his mode of living. The earliest farmers of a sort were the Neolithic men who lived in Europe 10,000 to 12,000 years ago. These people were known to have domesticated horses, cattle, sheep, goats, pigs, and dogs<sup>10</sup> (table 1).

The probable origin of anthrax was in early Mesopotamia and Egypt, where agriculture was established 6,000 to 7,000 years ago.<sup>10</sup> There is evidence that anthrax did occur, especially in Egypt. Perhaps the first record of anthrax is in the Bible in Exodus, Chapters 7 to 9. About 1491 B.C. Moses and the Israelites were in bondage to the Egyptians. Moses had warned Pharaoh, "The hand of the Lord will fall on your livestock in the fields, on horses, asses, camels, herds, and flocks, with a very severe murrain." The warning was fulfilled and the resultant fifth plague was undoubtedly anthrax, since the disease was carbuncular and all Egyptian cattle died. While the Egyptian cattle grazed in the flood-ridden lowlands, the unaffected Israelite cattle grazed separately on high lands. To this day, river basins subject to annual flooding are notorious for periodic outbreaks of anthrax.<sup>11,14,17</sup>

Other outbreaks are recorded in ancient Hindu literature. The Indians, by 500 B.C., had classified and described many cattle diseases, among them anthrax.<sup>11</sup> Yet, as late as the eighteenth century, many anthrax outbreaks were unrecognized in Europe.

Early Greece was confronted with anthrax. Homer (1000 B.C.?) and Hippocrates (400 B.C.) had recognized the disease. Galen (200 A.D.?) also wrote on this subject.<sup>6,14</sup>

The early Greeks believed that sudden deaths of their cattle, with symptoms suggestive of anthrax, were caused by bites of the shrew mouse. The preservation and dissemination of Greek writings helped perpetuate this superstition far into the eighteenth century, preventing earlier scientific investigation into the real cause.<sup>11</sup>

The Romans also observed anthrax. Virgil (70-19 B.C.) described a plague of anthrax in Rome, reporting that there seemed to be no cure for horses, cattle, and sheep. He observed that meat eaten from animals which died of the disease could infect the eater. He graphically described the human syndrome resulting from wearing hides or wool taken from these animals and recommended slaughter of all affected animals, rather than trying to treat animals with the disease.<sup>11</sup> Our present-day policy for controlling anthrax is based on these fundamental principles. In addition to his other attributes, Virgil probably had the best grasp of the anthrax situation of any man up to the eighteenth century.

Anthrax was probably common in early Rome. It is said that in the five centuries B.C., 15 major plagues struck Rome, beginning with one of anthrax which cut the entire human and animal population in half.<sup>11</sup> This was too early to have contributed directly to the fall of the Roman empire, but it may have had an indirect influence.

A tenth century collection of veterinary writings, the "Hippiatrica," refers to anthrax on several occasions. Apsyrtus described the disease and termed it "incurable." Elsewhere in the collection: a superstitious treatment is prescribed: "ashes of swan burned alive and mixed with wine."<sup>11</sup>

The eleventh century work, "The Medicine of Quadrupeds," describes a rapidly fatal disease which Smithcors<sup>11</sup> believes to be anthrax. Treatments prescribed by the

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Anglo-Saxon writers emphasized the major attempt to break away from the fairly scientific methods of early Egypt, Greece, and Rome. Leechcraft was the vogue of the day.

By the sixteenth century, little progress had been made. Fitzherbert recommended that animals dying of anthrax be killed for food. Those already dead, however, were buried and the hides sent to tanners.<sup>11</sup> One of the major outbreaks of this century occurred in 1613 in southern Europe where anthrax developed into a major plague, killing over 60,000 people. Charms, recipes, and incantations were employed, to no avail, to ward off the then-called "black bain."<sup>4,14</sup>

Thomas Blundeville (16th century) was probably the first really important veterinary writer in the English language. He discussed anthrax intelligently and urged that swine be kept out of stables, recognizing a relationship between swine and outbreaks of anthrax.<sup>11</sup>

The first scientific literature on anthrax was begun in 1769 by Dijon of France. His article, "Charbon Malin," described the disease in man and animals. The scientific proof for the contagiousness was finally established in 1823 by Barthelemy.<sup>14</sup>

#### PROGRESS IN THE NINETEENTH CENTURY

Up to this time, the history of anthrax was sketchy, confounded by a mass of misinformation and superstition. However, the nineteenth century was to become the "golden era" of anthrax research.

The first man to see the rods of *Bacillus anthracis* under the microscope was a veterinarian, M. Delafond, who was a professor of veterinary medicine at the Alfort Veterinary School in France. As far back as 1838, he had said that blood from animals with anthrax contained "little rods," the significance of which he did not understand.<sup>18</sup> Credit for this observation is often erroneously given to Davaine, 1850.<sup>2,5</sup> Pollender, in 1855, claimed he had also observed the little rods as early as 1849.<sup>5</sup> Brauell in 1857 to 1858 had artificially transmitted the disease from man to sheep and isolated the organisms after death.<sup>5</sup> Thus by 1858, at least four men had seen the "little rods," yet none appreciated the significance of them.

At this stage in the history of anthrax, a turning point was impending. Over the

TABLE I—Chronological History of Anthrax

Date	Historical event
5000 B.C.	Earliest major farming efforts (Egypt, Mesopotamia).
1491 B.C.	Anthrax outbreak in Egypt—5th plague of Egypt.
1000-400 B.C.	Greeks (Homer, Hippocrates) recognized anthrax.
500 B.C.	Hindus classified and described anthrax.
70-19 B.C.	Virgil observed incurability, contagiousness.
DARK AGES . . .	Missing Records . . .
900-1000 A.D.	Anglo-Saxons begin trend to leechcraft.
1613	Sixty thousand persons died in South Europe epidemic.
1700's	First outbreak in United States (Louisiana).
1769	First scientific article on anthrax (by Dijon).
1834	First reported case in man in United States.
1838	Bacillus first seen under microscope by M. Delafond.
1858	Four men had seen bacillus; era of great European plagues.
1868	Davaine showed that the bacillus produced the disease.
1877	Etiology demonstrated conclusively by Pasteur and Koch.
1877	Life cycle of bacillus discovered by Koch.
1881	Successful vaccination by Pasteur at Pouilly-le-Fort.
1895	Antiserum produced in horses by Sclavo.
1912	Improved spore vaccines.
1926	Neosphenamine used as treatment by Pijper.
1944	Penicillin introduced as treatment in man.
1947	Important tenacity studies by Stein.
1948	Penicillin used to treat animals.

previous centuries one can visualize how anthrax outbreaks affected social and economic conditions. But in the middle nineteenth century, the social and economic conditions were ripe to affect the history of anthrax. Anthrax was becoming a wide-scale menace, no longer occurring sporadically in restricted locales. In France, the disease was killing 20 to 30 per cent of all cattle and sheep and in some provinces 50 per cent of the animals were dying. Anthrax was becoming panzootic throughout Europe. As Vallery-Radot put it, "This disease is ruining agriculture."<sup>18</sup>

Laymen, as well as men of medicine, were well aware of the syndrome: blood at external openings, shaking limbs, gasping for breath, and sudden death. In many places, anthrax struck with such severity that it was said: "... death supervened, often before the shepherd had had time to notice the attack." Various names were applied to the disease, including the ones we know today, such as "milzbrand," "charbon," "splenic fever," "malignant pustule," and "wool sorters disease."<sup>2</sup>

The disease spread into Russia. In Novogrod, between 1867 and 1870, 528 people had died, along with 56,000 cattle.<sup>1a</sup>

In the United States, anthrax had been introduced originally into Louisiana at the time of French settlement in the early 1700's. In the nineteenth century, the United States witnessed wide-spread epizootics similar to those in Europe. It was reported in Mississippi in 1865, Texas in 1860, New York in 1881, Vermont and Massachusetts in 1887, and California in 1888.<sup>1a</sup>

With this prevalence of anthrax in the world, people became desperate to solve its riddles. The momentous discoveries which were later unraveled were actually born of necessity. Anthrax was no longer of only academic interest; it became important to nearly everyone, starting a frenzy of scientific effort.

Davaine, who had seen the bacillus in 1850, had since dropped the matter as a scientific oddity. Meanwhile, Pasteur in 1861 had demonstrated in his studies of butyric acid fermentation that microorganisms could produce effects out of all proportion to their size; this gave food for thought to Davaine who then became suspicious of the true nature of his anthrax "bacterides." This led to his discovery, in 1863, that only blood of sick animals had the organisms. By 1868, Davaine had shown that anthrax rods could transmit the disease. And in 1873, he had shown that blood passed through a clay filter was not infective.<sup>2,5,14</sup>

Pasteur devised many experiments to prove the etiological role of anthrax bacilli. He filtered cultures through membranes fine enough to remove the bacilli and showed that injections of clear filtrate could not produce the disease. He also allowed the bacteria to settle out of a culture; he then demonstrated that the supernatant fluid would not produce disease, whereas the sediment produced it with ease. Not only did such experiments prove the cause of anthrax, but they also firmly established the germ theory of disease.<sup>2</sup>

Many writers credit the isolation of the tubercle bacillus in 1882 as proof for the germ theory of disease. But, as we have shown, it was in reality anthrax. Anthrax had probably not received its due recognition because it was not thought to be as important to man as tuberculosis.<sup>1</sup>

At the time of Pasteur's experiments (1877), Robert Koch, a German physician, had concluded similar work.<sup>3</sup> He had worked out the complete life cycle of the bacillus. Koch had had much contact with anthrax in farm animals during his rural practice. His laboratory was a crude homemade affair in his own house. He transferred the infection in series from mouse to mouse, then removed the spleens and watched the organisms grow under the microscope. After 20 hours, the rods had grown into long filaments, and oval granules appeared inside the rods, which he recognized as spores. He saw the cycle of growth from Delafond's motionless rods to the fully formed spore. He determined the optimum temperature for spore formation and saw that spores could turn into rods.<sup>2</sup>

The now famous "Koch's postulates" were actually proved with anthrax. Koch had cultured anthrax, transferred it, and recovered it in pure culture. These postulates actually originated with Koch's professor of pathology, Henle in 1840; but since Koch was the first to satisfy them, the rules have been credited to him.<sup>1,5</sup>

*Vaccination Against Anthrax.*—The first attempts to vaccinate against anthrax were made in 1880 separately by Chauveau and Toussaint. This created little impact on scientific imagination and it was left to Pasteur to convincingly demonstrate the principle.<sup>5</sup> Ultimately, Pasteur's discovery rocked the medical circles of his day. The official report was issued with Chamberland and Roux in 1881.<sup>9</sup>

His vaccine was prepared by forcing the bacilli to grow without producing spores, by adding antiseptics and by maintaining the cultures at 42 to 43 C. The attenuation became a function of culture time and he could maintain cultures of variable virulence. This vaccination procedure consisted of an initial weak injection followed by a stronger one 12 days later. Pasteur then set about to publicly demonstrate his technique in a farm field test. There was much criticism from physicians and veterinarians who had eagerly gathered at the demonstration to watch Pasteur become a laughing stock. The affair, highly publicized in advance, took on international importance. Members of the press, farmers, and scientific people were present.<sup>2</sup>

The experiment was originated and supervised by a veterinarian, M. Rossignol,



one of the few who placed his faith in Pasteur's theory. It took place at Rossignol's farm in Pouilly le Fort, on May 5, 1881. Pasteur inoculated 24 sheep, 1 goat, and 6 cows with 5 drops of attenuated culture; on May 17, all were re-inoculated with a more virulent culture. On May 31, the challenge injection was made; controls consisted of 24 sheep, 1 goat, and 4 cows. When the check was made on June 2, all of the vaccinated animals were well; 21 control sheep and the goat were dead; the 4 control cows had febrile reactions and local swellings; 2 control sheep died in front of the spectators and the last died at the end of the day.<sup>2</sup>

Vaccination gained wide acceptance and, by 1894, in spite of inefficient vaccine production methods, some 3,400,000 sheep and 438,000 cattle had been vaccinated. Mortality from the vaccine ranged from 0.3 per cent to 1.0 per cent.<sup>2</sup>

Studies on the cause and immunity of anthrax led Pasteur to observe other phenomena of the disease. Pasteur had confirmed Koch's discovery that spores of anthrax could survive for long periods.<sup>2</sup> Pasteur showed that they could survive as long as 12 years.<sup>5</sup> He also showed that earthworms bring buried spores up to the surface and advised the farmers to burn dead carcasses.<sup>2</sup>

The natural resistance of birds to anthrax was explained by Pasteur as being due to their high body temperature (anthrax does not grow well in mediums over 38 C.).

Pasteur also observed that anthrax cultures which were contaminated by certain common microorganisms lost their pathogenicity. He concluded that the contaminant creates a condition unsuitable to anthrax. Further observations showed that dual injection failed to establish infection.<sup>2</sup> These observations were later fulfilled by Flemming with penicillin.

The forms of anthrax in man—respiratory, intestinal, and cutaneous—were classified by Wagner in the nineteenth century.<sup>6</sup> Another important discovery was made by Scavo of Italy in 1895. He had produced an antiserum in horses (much as we do today) which was put into wide use in treating man. For 30 to 40 years thereafter, serum remained the most effective treatment of anthrax.<sup>14</sup>

Use of spore vaccines is the most widely accepted form of vaccination today. These

vaccines were originally developed and improved by Zenkowsky of Russia, Detri of Hungary, and Nitta of Japan, beginning around 1912. Simultaneous use of spore vaccines and antiserum was introduced in 1916 by Eichhorn of the United States.<sup>14</sup>

#### TWENTIETH CENTURY DEVELOPMENTS

During World War I, the well-known "shaving brush incidents" occurred. Horsehair from Siberia and China were traced as the source of anthrax on shaving brushes.<sup>14</sup>

In the United States, following World War I and up to 1938, 1,683 cases of anthrax in man were recorded.<sup>2</sup> From 1945 to 1954, the U.S. Public Health Service had reported only 483 cases in man.<sup>16</sup> Most of these cases in recent times have been occupational. Leather plants and wool and hair industries have been among the more hazardous industries.<sup>10,14</sup>

Most trends in the treatment of anthrax have developed since Scavo's antiserum in 1895. Neosarsphenamine was introduced as a treatment in 1926 by Pijper of Britain. Eurich, in 1933, combined neosarsphenamine with antiserum and treated 200 individuals, with a fatality of 5 per cent. It has not, however, been established that antiserum really assisted in the recoveries.<sup>14</sup>

One of the greater moments in the procession of treatment developments was the first use of penicillin. In 1944, Murphy and his co-workers successfully treated three female wool workers who had cutaneous anthrax. The dose range was 150,000 to 475,000 units.<sup>8</sup>

One of the first reports of penicillin treatment in animals was by Sugg in 1948.<sup>12</sup> He reported using 1 million units in 8 clinically affected calves. Temperatures were about 106 F., yet all 8 recovered. The four-year delay between use of penicillin in man and in animals may be explained by the fact that control measures in animals provided for killing rather than treating those infected.

Treatment trends today are away from the antiserum and toward the use of neosarsphenamine and penicillin. In animals, disposal of the affected and vaccination of the exposed are the prime means of control.<sup>14</sup>

Anthrax areas have been fairly well mapped throughout the world. In the United States, it has occurred most regu-

larly in South Dakota, Nebraska, Oklahoma, Mississippi, Louisiana, Texas, California, Vermont, New Jersey, Delaware, Wisconsin, Utah, Nevada, and Oregon.<sup>7</sup>

World-wide, the enzootic areas are in Russia, Siberia, Turkey, Asia Minor, Persia, Mesopotamia, India, Tibet, Japan, Egypt, South Africa, Australia, North and South America.<sup>10,16</sup>

Stein, who did much of the modern work on anthrax, pointed out the connection with river valleys in these enzootic areas. He stated that outbreaks appeared after hot, dry summers in which swamps dried up and short vegetation caused close grazing.<sup>13,15</sup>

Incidence reports of anthrax have been declining over the past years. In the United States, between 1945 and 1955, there were 3,447 outbreaks in 39 states, with losses of 17,604 animals. Vigorous control efforts kept the total number of deaths to a minimum and averted the panzootics of earlier centuries. This period was highlighted by the outbreaks of 1952, which were caused by swine in the Midwest eating raw infected bone meal imported from Belgium. During that year, there were 1,642 outbreaks in 32 states, with a total loss of 3,451 animals.<sup>14,16</sup>

Incidence in man has shown a corresponding decline. Figures from various health departments indicate that in recent years there have been less than 100 cases annually in the United States.<sup>14</sup>

#### CONCLUSIONS

This slow but progressive success in controlling anthrax is more than a mere recital of the history of the disease. It is, in a sense, a history of men, men of stature who were intelligent, perseverant, and visionary. Men like Virgil, Delafond, Davaine, Pasteur, Koch, and others gave us not only facts about anthrax, but also a basis in logic and precise experimental methods. From these men arose many benefits to the realm of medicine. From them were derived the germ theory of disease, the sciences of bacteriology and immunology, a basis of chemotherapy, and elaboration of the scientific method. Despite all the destruction and misery caused by anthrax over the centuries, immeasurable good has emerged.

The story of anthrax is not complete. As years go by, it will continue to accompany

agrarian civilizations. But knowledge, so painfully extracted in years past, provides us with the assurance that anthrax will at least be held in check in the future.

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# The Earliest Account of Anthrax in Man and Animals in North America

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ANTHRAX was already a danger to man and an important problem among the livestock of Louisiana when, in 1839, it was first recognized and its introduction traced to the days of the French colonization.<sup>3</sup> Animals in other areas of North America as far north as Philadelphia had become infected before 1839 but how early is not known. In 1836, 4 cases of malignant carbuncle were described in Philadelphians who were infected while skinning cattle that had died of "the murrain."<sup>5</sup> In 1824, J. Kercheval, a physician from Bardstown, Ky., had described "a remarkable disease among cattle and the propagation to the human species."<sup>4</sup>

The latter report,<sup>4</sup> which has previously been neglected by students of anthrax, will be discussed in this paper. It appears to have been the first account of anthrax published in North America. It is quoted in full.

I have lately witnessed some cases of an anomalous and extraordinary disease, which appeared to proceed from an infection communicated by the bodies of cattle that had died of a singular and fatal disease that raged among them.

This disease first made its appearance among the cattle of this neighborhood during the summer of 1819, and its fatality was so great that horses, cows, and sheep were alike the victims of its fury. Cattle brought to the fold in the morning apparently in good health died before noon; and many that had taken their accustomed food in the evening were found dead in the morning; nay, those grazing in the fields, but half an hour before, were seen writhing under the pangs of death, and dying in a few minutes.—Death in such cases was often attended with violent agitations and manifestations of the most agonizing distress.

The external signs of disease were an intumescence sometimes originating in the throat but generally commencing at the breast and extending along the sides to the flanks and uniting across the lumbar regions. These swellings were soft and elastic, resembling inflations, and upon postmortem examination were found to contain

extravasations of grumous blood and effusions of coagulable lymph, and were of a dark and gangrenous appearance. The blood in some instances were so dissolved that it transuded through the pores of the skin.

Such were the prominent features of this most deadly distemper. Alike novel in its character and unique in fatality, it is viewed here, as a new disease; nor is my knowledge of veterinary pathology sufficient to enable me to assign its appropriate rank among the many maladies of our domestic animals.

In the human subject this disease, or at least one which was derived from it, commenced in a small and circumscribed vesicle, containing a dark and turbid fluid, exhibiting an appearance not unlike that which is sometimes excited by the first effects of spurious vaccine matter.—This cuticular elevation extending itself equally in every direction, formed a circular and progressive margin to the ulcer, and as it receded the centre became livid, black, and finally sphacelated. This gangrenous spot became encompassed in the course of its progress with a hard swelling of very great extent, attended with a peculiar torpidity and loss of sensorial power in the part.

Almost simultaneous with the appearance of local affection the entire system become more or less deranged. The constitutional affection commenced by chills and rigors, these were soon succeeded by febrile excitement, attended with dull aching pains in the joints and extremities, headache, and a distressing sensation of pains along the course of the spine. In one instance petechiae appeared upon the skin. All these symptoms were accompanied by much prostration of the vital powers, and the disease exhibited a train of phenomena, altogether novel and perplexing.

In the treatment of this malady, after a few general remedies adapted to the state of the system, my attention was more immediately directed to the local affections. With a view, therefore, of bringing the remedial articles to act more immediately upon the subjacent parts, I removed, by excision, the superincumbent dead parts. Although in several instances this was effected in considerable masses, yet such was the insensibility of the parts, that the scalpel gave little or no pain, nor did the most potent stimuli and antiseptics excite, for some days, the lightest sensation.

The carbonate of potash in substance and a saturated solution of the muriate of ammonia in vinegar appeared to be beneficial as applications

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to the diseased parts. I also derived advantage I thought, from dressings dipped in the compound tincture of myrrh and aloes, covering at the same time the contiguous surface with stupes out of cold aqueous solutions of acet. plumb. [lead acetate].

Although the ulcers were extremely malignant and inveterate, yet by rigidly persisting in this treatment, at the end of five or six days, a circumscribed margin of red and healthy granulations announced, in every case, the arrest of the gangrene and restoration of the healthy action of the parts surrounding the slough. During the process of sloughing, I applied the submuriate of mercury to the part, and exhibited pulv. [powdered cinchona bark] cinchom with evident good effect.

With regard to the origin and character of this disease, it may be observed, that no one was affected with it, who had not been previously engaged in flaying or otherwise handling and touching the carcase of an animal that had died of the distemper described. In three out of four persons, in whom the disease occurred, it made its first appearance upon the fore arms. In the fourth gangrenous pustules appeared on the cheek. All persons, however, who were thus employed upon the carcases of animals, were not affected with this disease. Nor did I hear of any person of colour having received the disease. This may have been owing to the morbid virus not coming in contact with sensible or absorbent parts, for want, in those instances, of a scratch, or abrasion of the skin.

The question concerning the historian is whether the "remarkable disease" Kercheval described corresponds to the picture of anthrax as we now know it. Stein,<sup>7</sup> in 1942, described the disease in this manner: When anthrax is acquired through infected food, the usual route in cattle, sheep, and horses, the first indications are frequently signs of colic. Rapidly progressive swellings develop over the body especially about the neck, lower abdomen, and external genitalia. In acute and subacute forms there is an early state of excitement followed by depression and stupor, spasm, evidence of respiratory or cardiac distress, and staggering. Death occurs in two to five days. In the peracute cases, the onset of the disease is sudden. There is staggering, collapse, a few convulsive movements, and death. Death may occur in less than 24 hours. On necropsy, the blood is found to be considerably darker than normal. It does not clot readily and is frequently spoken of as being tarry. Hemorrhages beneath the skin are common. Clear or somewhat blood-tinged gelatinous exudates are found between the muscles

and beneath the skin, especially in the area where swellings were seen before death.

Man is rather resistant to anthrax and is usually affected by a cutaneous form of the disease, although fatal cases do occur. Smyth,<sup>8</sup> in 1947, described the lesions that follow infection through wounds in the skin or mucous membrane: "At the site of infection, a painful, bright red blister arises surrounded by an area of erythema. This develops within one to two days into a large, dark red vesicle whose center turns black. The lesion is then surrounded by an area of edema that becomes hard but not painful."

The descriptions of 1824 and those of the recent investigators agree in almost all particulars. All are of a peracute disease of cattle characterized by subcutaneous swellings, dark, tarry blood, and gelatinous infiltration of the tissues. All are of diseases transmissible to men who are in contact with the flesh or skins of the dead animals and are recognized in man by the black-centered vesicle that appears on the skin. Only one word in Kercheval's account appears inappropriate—the word "grumous," to describe blood—since in anthrax the blood is characteristically slow to clot. However, he mentions unclotted blood as well as "grumous" blood because in his next sentence he refers to blood as being dissolved. It is difficult to imagine a condition or set of conditions other than anthrax that could produce "the remarkable disease among cattle" reported by Kercheval.

The history of anthrax has been that once an area is contaminated it remains for many years a potential source of new cases. So we should ask, has anthrax recurred in or near Bardstown, Ky., since 1824? The distribution of anthrax in the United States over the past 50 years has been reviewed in two papers. The first,<sup>2</sup> in 1920, presented evidence of 4 cases of anthrax in man in Kentucky and the record by Stein<sup>7</sup> includes one outbreak of the disease in cattle in that state.

It is probably significant that 2 of the 5 cases of anthrax reported in Kentucky between 1900 and 1950 were from the Bardstown area (table 1). Although the spores of anthrax have remarkable tenacity and have been reported to remain viable for 40 years, it is not necessary to assume that spores formed in 1824 produced the infection in 1916. Unreported outbreaks of anthrax may have occurred over the years.

TABLE 1—Cases of Anthrax Reported in Kentucky  
Between 1900 and 1950

Date	Subject	Location	Note
1913	Man	Graves County	Western Kentucky
1913	Man	Bullard County	On Ohio River
1916	Man	Hodgenville	Near Bardstown
1916	Man	Bardley	On Ohio River
1932	Cow	Bullitt County	Near Bardstown

Perhaps accounts<sup>1</sup> like the following, which appeared in a Cincinnati paper in 1830, could be found in many old newspaper files.

**Cows Poisoned**—A large number of cows, belonging to the citizens, are turned out daily to graze on the common Mill Creek bottom, where they eat of some plant which poisons them. Last year, a number of cows were poisoned from grazing on those bottoms, and two persons lost their lives by skinning some of them. This season, we are informed, as many as fifty valuable cows have been lost from the same cause, and four persons poisoned and died, who were employed in taking off their skins. We mention this fact as a caution to those whose cows may sicken and die from being poisoned.

#### SUMMARY

Anthrax was probably introduced into the Ohio Valley in the early days of the westward migration and has persisted in some localities to the present. Kercheval described an outbreak of anthrax in cattle in 1824 and the infection of four farmers who handled the dead carcasses. As far as is known, this was the first published account of anthrax in North America.

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## Stress as a Factor in Erysipelas in Swine

Investigations have long shown that the equation "positive agent + animal = disease" is not valid for swine erysipelas. Other factors play a role in the development of the disease. Experiments have indicated that a lack of certain vitamins as well as ascariasis favor development of erysipelas and may account for some sporadic cases in the winter. Epizootic charts show that the disease is lowest during the winter, and highest in the hot summer months. Whether high temperatures and humidity increase the pathogenicity of the organism, due to a change in its living conditions, or decrease the animal's susceptibility, or whether both are factors has not yet been determined.

Three serotypes of *Erysipelothrix rhusiopathiae* (A, B, and N) have been demonstrated. Apparently serotype A causes septic erysipelas, serotype B causes local urticaria, and serotype N causes no reactions at all. Only types A and B are immunogenic. In the summer of 1958, the tonsils of 130 swine from the Munich abattoir were cultured, with the erysipelas bacillus being isolated in 60.7 per cent. Of these, 77.2 per cent were serotype A, 15.2 per cent B, and 7.6 per cent N. Of the organisms isolated from diseased swine, 83.3 per cent were serotype A and 16.7 per cent serotype B. A reverse proportion was found in porcine tonsils in Poland, with 51 per cent serotype N and only 2 per cent serotype B. This indicates that there are regional variations which are possibly due to differences such as in the alkalinity, composition, and temperature of the soil.

All serotypes probably originate from serotype A as a result of varying cultural conditions such as symbiosis, antibiosis, or antagonisms occurring either in the soil or in the intestinal tract. In the latter, the effect of particular feedstuffs is of importance. Similar observations have been made *in vitro*. Serotype A is almost always isolated from organs of diseased animals. Its rate of multiplication is almost twice that of serotypes B and N. Also, serotype A strains form much more hyaluronidase, an agent which enhances infection, than do the other types.

To prove the effect of high temperatures and humidity, as well as of different sero-

types of organisms in the production of disease, 45 pigs were used in an experiment. Ten pigs were placed in each of three chambers and were exposed for four days to a temperature of 82.4 F. and humidity of 70 per cent during the daytime; 64.4 F. and 90 per cent humidity at night. Five pigs in each control group were kept in normal pens at an average temperature of 64.4 F. and a humidity of 70 per cent. On the second day, 1 pig in each principal and a control group were orally inoculated with either serotype A, B, or N organisms. On postinoculation day 3, 8 of the 10 pigs under stress and given serotype A developed erysipelas septicemia while all the others remained well. Five days later, all pigs that remained well were fed five times their first dose of the same organism yet none became ill. The reduced resistance thus produced in swine is believed to be due to the disturbance in body heat, which the animals can not control by sweating and because of the subcutaneous fat. Therefore, prophylactic measures should include providing the swine with cool, and sanitary quarters, frequent changes of litter (decomposing feces is not only heat producing but also excellent medium for the multiplication of the organism), disinfection, and providing shade and cooling water bath facilities.

Erysipelas can not be eradicated because the organism is ubiquitous. The disease should not be considered as an epizootic. Vaccination can only limit its economic effects.—J. Kalich in *Tierärztl. Umschau*, 7, (July 1, 1959): 232.

### Antibiotic Feeding and Erysipelas

In an experiment with 30 swine, half were fed chlortetracycline and half were fed no antibiotic. Ten from each group were then exposed, artificially, to extreme variations in weather conditions and all 30 were orally infected with erysipelas organisms.

All of those not exposed to environmental stress remained well, whereas each of the 10 fed the antibiotic and 9 of the 10 fed no antibiotic developed erysipelas. All of the sick animals were treated with penicillin, tetracycline, or anti-swine erysipelas serum with good results. However, those given antibiotics recovered more rapidly than those given the serum.—J. Kalich et al. in *Tierärztl. Umschau* (May 1, 1959): 177.

### Erysipelas Also Seasonal in Japan

The five-year statistics (1953-1957) in Japan show the following total cases of erysipelas in swine as reported by months: January, 32; February, 74; March, 56; April, 173; May, 356; June, 583; July, 361; August, 265; September, 140; October, 195; November, 133; and December, 43. The total number of cases per year varied from 388 in 1955 to 565 in 1957.—*Statist. Anim. Hyg.* (1958): 34.

[As frequently observed in America, the peak month was June, with a secondary peak occurring in October—this in spite of the different feeding methods in the two countries.—W.A.A.]

### Experimental Erysipelas

An attempt to cause endocarditis in swine by keeping them in unsanitary quarters, where the litter was regularly sprinkled with *Erysipelothrix* organisms, was unsuccessful. The animals developed a sub-clinical infection which resulted in immunity.—G. Wellmann and H. Liebke in *Deutsche tierärztl. Wchnschr.* (May 15, 1959): 268.

### Prevention of Anemia in Young Pigs

The results of an experiment at Purdue University showed that injections of pigs with 2 cc. of iron dextran when 3 days old and 1 cc. when 3 weeks old, plus feeding soil daily, resulted in a higher hemoglobin level (12.4%) when 5 weeks old and a greater weight (23.1 lb.) when 6 weeks old than did either of these methods alone. For soil feeding alone, these values were 10.2 per cent and 21.1 lb., and for two iron injections only, 10.7 per cent and 21.4 lb. With one iron injection plus soil feeding, the values were second best — 11.4 per cent and 22 lb., respectively.—*Nat. Hog Farmer* (Sept., 1959): 12.

### Debeaking Pullets for Cannibalism

It is best to debeak pullets when they are placed in the laying houses, but they can be debeaked at any time when cannibalism occurs, even when in heavy production. To facilitate eating and drinking after debeaking, an inch or more of mash should be kept in the feeders, grain should be kept in troughs for a few days, and water in containers deep enough for easy drinking.—*Successful Farming* (Aug., 1959): 20.

# A Technique for Producing Satisfactory Animal Radiographs

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THE PURPOSE of this paper is to describe a technique that will enable veterinary practitioners to take satisfactory radiographs. A formula is described that eliminates guesswork.

I have examined many radiographs that were either over- or underexposed. Some were submitted by practitioners, but many were taken by myself and by my colleagues. The faulty technique resulted in additional radiographs having to be taken or an attempted interpretation without a completely satisfactory radiograph.

## PRELIMINARY INVESTIGATIONS

Cassettes containing high-speed intensifying screens and the standard screen-type film were used. Three of the four factors were stabilized as follows: milliamperes—10; exposure time— $\frac{1}{4}$  sec.; distance from x-ray tube to film—36 inches. These values were arbitrary, but they were selected for the following reasons: (1) Many x-ray timers do not have a shorter period than  $\frac{1}{4}$  sec.; (2) all machines have a minimum of 10 ma. output; (3) 36 inches is generally

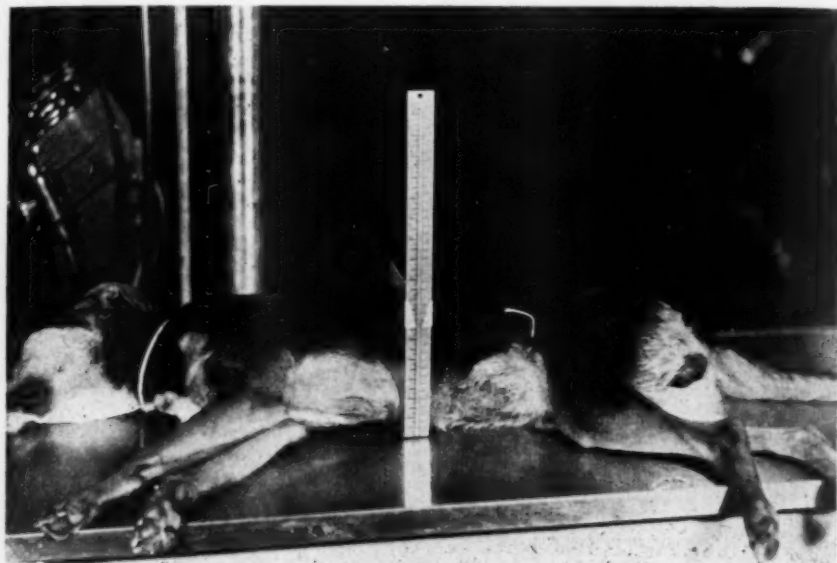


Fig. 1.—Technique for radiographing the ventrodorsal aspect of a dog's pelvis. A metal caliper is used to measure centimeters of thickness: thickness of part—11 cm.; kilovoltage reading—60.

For every radiograph, four exposure factors have to be considered: milliamperes, kilovolts, length of exposure time, and distance from the x-ray tube to the film. These factors are adjusted according to the density and thickness of the object to be radiographed.

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accepted as a satisfactory tube-film distance. This left the factor of kilovolts to be varied with the thickness of the part to be radiographed.

The dog selected to be radiographed measured 11 cm. through the pelvic region (fig. 1). The previously described stable factors were used, and four radiographs of the pelvis were taken, the kilovoltage varying with each. The most satisfactory radio-





graph was produced with 60 kv. This radiograph resulted from the following formula: milliamperes—10; seconds (time)— $\frac{1}{4}$ ; inches (tube-film distance)—36; kilovolts for a pelvis 11 cm. thick—60.

Using 60 kilovolts and 11 cm. as a base point, we varied the kilovoltage at the rate of 2 kv. for every 1 cm. of thickness of the part to be radiographed; for example: 11 cm. thick = 60 kv.; 12 cm. thick = 62 kv.; 10 cm. thick = 58 kv.

### RESULTS

Within narrow ranges, the results were satisfactory. Therefore, the formula was further tested by varying the thickness to cover all areas of the average dog. The thickness varied from 2 cm., using 42 kv.,

4

Fig. 2—Ventrordorsal radiograph of a dog's pelvis: thickness of part—11 cm.; kilovoltage reading—60.



Fig. 3—(Left) anteroposterior radiograph of a dog's leg: thickness of part—6 cm., kilovoltage reading—50; (right) lateral radiograph of a dog's leg: thickness of part—3 cm., kilovoltage reading—44.



to 20 cm., using 78 kv. These results were also satisfactory. Finally, it was determined that the density of the various parts of an animal did not complicate the single formula (fig. 2, 3, and 4 illustrate radiographically the result of the technique).

To determine the milliamperes seconds (ma. sec.), multiply milliamperes by seconds. When a Potter-Bucky grid is needed, increase the ma. sec. by a factor of 5. For example—technique for nongrid radiograph:  $\frac{1}{4}$  sec.  $\times$  10 ma. = 2.5 ma. sec.; technique for grid radiograph:  $\frac{1}{4}$  sec.  $\times$  50 ma. = 12.5 ma. sec. Then, any combination may be selected; e. g.,  $1\frac{1}{4}$  sec.  $\times$  10 ma. = 12.5 ma. sec.;  $\frac{1}{4}$  sec.  $\times$  50 ma. = 12.5 ma. sec.;  $\frac{1}{2}$  sec.  $\times$  25 ma. = 12.5 ma. sec.

The following chart is attached to the lead shield near the control panel of our x-ray machine, so that anyone can quickly select the correct kilovoltage setting:

10 ma. — 36" F.F.D.\* —  $\frac{1}{4}$  second

(Continued on page 470)

Tissue thickness (cm.)	Kilovolts peak
1	40
2	42
3	44
4	46
5	48
6	50
7	52
8	54
9	56
10	58
11	60
12	62
13	64
14	66
15	68
16	70
17	72
18	74
19	76
20	78
21	80
22	82
23	84

\*Focal-film distance.

Fig. 4—Lateral radiograph of a dog's thorax: thickness of part —13 cm.; kilovoltage reading—64.



## SUMMARY

A standardized technique for taking radiographs of animals provides for constant milliamperes, exposure time, and x-ray tube film distance. The kilovolts are increased or decreased according to tissue density and thickness. The technique described has the following static factors: milliamperes, 10; distance from tube to film, 36 inches; exposure time,  $\frac{1}{4}$  sec. The base point is 60 kv. for 11 cm. thickness; 2 kv. are either added or subtracted as each centimeter of tissue varies from 11 cm.

Use of this technique results in a saving of time and fewer radiographs retaken because of improper exposure.

## Animal Breeding Abstracts

The following items were taken from *Animal Breeding Abstracts*, June, 1959.

*Attempt to Cross Cattle with Elands.*—When domestic cows were mated naturally or artificially with male elands, and visa versa, the spermatozoa survived longer than one day and reached the upper portion of the uterine horn; however, no pregnancies resulted. In artificial insemination, the results were the same when seminal plasma was exchanged for that of the other species.—*Item 615, p. 151.*

*Effect of Seminal Vesiculectomy on Bovine Semen.*—When the seminal vesicles were surgically removed from 4 normal bulls, the volume of semen was reduced and the concentration of spermatozoa increased. The percentage of live spermatozoa was reduced, the pH value increased, and the mean values of seminal fructose and citric acid were reduced. The addition of fructose and citric acid to the semen had no effect. Libido was not affected by the operation.—*Item 774, p. 183.*

*Monodactyl (Mule Hoof) in Pigs.*—Monodactylism occurs in native pigs in Romania but the incidence is not high. In all other respects they are similar to bidactyl pigs. The condition is probably hereditary.—*Item 912, p. 209.*

*Milk Production of Sows.*—Milk yields, through 71 lactations, of Large White sows were determined by weighing pigs before and after nursing. The average yield was

5.3 kg. (nearly 3 gal.) daily for 56 days. Sows generally yielded 20 to 30 per cent more milk in the second lactation than in the first; they showed little increase thereafter.—*Item 878, p. 202.*

*Skin Graft Tolerance in a Freemartin.*—Skin grafts were exchanged between 5 pairs of twin lambs of opposite sex. In 4 of the pairs, the skin, as usual, died within ten days. In the other exchange, the skin grew normally; this female twin had an abnormal vulva and clitoris and was probably a freemartin since she had not shown signs of estrus at 2 years of age. A state of tissue tolerance may exist between a freemartin sheep and her twin as it does in identical twins.—*Item 860, p. 199.*

*Ovulation Time in Sows.*—Sows were tested for estrus, by teaser boars, every three hours; their ovaries were examined by laparotomy at intervals. Ovulation occurred 32 to 39 hours after the onset of heat in 94.7 per cent of sows after a single mating, but in only 58.3 per cent of unbred sows. The ovulation process lasted from one to three hours with an average of 13 to 14 follicles rupturing in gilts and at least 18 in adult sows. The sows averaged 8.7 pigs per litter.—*Item 928, p. 212.*

*Transport of Semen in a Sow's Uterus.*—A cannula was inserted into the uterine horn, near the fallopian tube, in 16 young sows. Semen reached the cannulas in an average of 17.1 minutes after a single, natural mating, and in 41.6 minutes after artificial insemination. An unequal amount of semen reached the two horns. However, when twice mated, the horn which had less semen after the first service had most after the second service.—*Item 929, p. 212.*

A second service, shortly after the first, resulted in 1.53 extra pigs per litter, but a third service resulted in no further increase.—*Item 931, p. 212.*

*Electric Shocks Stop Broodiness in Hens.*—Using a transformer to reduce an electric current to 12 volts, broodiness was eliminated in 96.6 per cent of 2,000 hens after one shock; in 99.6 per cent after two shocks at a 30-minute interval.—*Item 1090, p. 241.*

## Studies of Anestrus in Dairy Cattle

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ANESTROUS DAIRY cows may be considered under one of two general categories: first, those failing to be in estrus within 60 to 90 days following parturition; second, those going through a period of 60 to 90 days after insemination without exhibiting estrus, and upon examination are found not pregnant.

Anestrus in postpartum cows may be due to infection connected with parturition, inactive ovaries, quiet ovulations, or a retained corpus luteum. In addition, failure of observation by herdsmen could cause cows to be classified as anestrus although they had been exhibiting short or even normal estrous periods. Anestrus in non-pregnant cows could be caused by the same factors, or it could be associated with embryonic mortality.

Except in the case of infection, it would be difficult to classify the cause of anestrus in many cows, because the histories and initial examinations might reveal little information. Arbitrary treatment for anestrus, such as ovarian massage, corpus luteum removal, or hormone injection, could not readily be justified. Sometimes successful results from these methods are questionable due to the incidence of spontaneous recovery.<sup>1</sup>

The purpose of the research reported here was to determine the incidence of anestrus in a large dairy herd, and to see if some form of rational treatment could be used to manage anestrus cows successfully.

### LITERATURE CITED

In the University of Missouri Dairy Department herd, 11 per cent of 968 cows had their first estrus after 90 days postpartum.<sup>7</sup> In another study,<sup>8</sup> 15 to 20 per cent of the cows were reported as not having shown estrus by 60 to 90 days after

calving. Of 400 cows in the Cornell University herd, 6.75 per cent of the cows showed their first signs of heat after 90 days postpartum.<sup>11</sup>

In examining 1,403 cows for pregnancy from 60 to 75 days following breeding, one writer<sup>9</sup> found 14 per cent of the cows to be open with no estrous periods reported for them following insemination. Another<sup>6</sup> noticed that in herds in which he examined cows for pregnancy 45 to 60 days following insemination, the incidence for open and apparently anestrus cows was between 5 and 10 per cent.

### MATERIALS AND METHODS

All heifers and cows used in this work were in the Clemson College dairy herd. They were checked for estrus twice each day with "standing" heat being used as the criterion for identifying those in estrus. They were artificially inseminated in the midcervix from the middle to the late portion of the estrous period. The management of the herd called for breeding heifers for the first time between 16 and 20 months of age. Cows were bred as soon as possible after 70 days postpartum. Brown Swiss, Guernsey, Holstein-Friesian, and Jersey breeds and crossbreeds were studied.

Pregnancy examinations were made two months following insemination of heifers, and three months following insemination of cows.

### EXPERIMENTS AND RESULTS

#### *Anestrus in Cows Found Not Pregnant.*

—From February, 1953, through July, 1954, the ovaries of all heifers and cows which were open at the time of pregnancy examination (table 1) were examined.

Of 249 heifers examined, 19 per cent were not pregnant; of 380 cows examined, 8 per cent were not pregnant. The presence of a corpus luteum was noticed in most of the nonpregnant animals. Whether these corpora lutea were the cause of estrous failure or whether they simply represented corpora lutea of the estrous cycle was not established.

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This study was part of NE 41, "Endocrine Factors Affecting Reproduction and Lactation in Dairy Cattle," a regional study by agricultural experiment stations in the northeast, and the Animal Husbandry Research Division, U.S.D.A.

Contribution No. 311 of the South Carolina Agricultural Experiment Station.

TABLE 1—Results of Examination of Anestrous Dairy Cattle for Pregnancy

Classification	No. examined	Not pregnant		Not pregnant with corpus luteum	
		(No.)	(%)	(No.)	(%)
Heifers	249	47	19	27	57
Cows	380	32	8	19	59

Since corpus luteum expression has been used by many workers to treat anestrus, it was decided to determine whether corpus luteum removal would be of any value in correcting what appeared to be a herd problem.

Accordingly, heifers and cows found open with a corpus luteum on one ovary at the time of pregnancy examination were alternately allotted to one of two groups:

ceived almost as soon (28 days) after examination of the ovaries as did those in the experimental group after corpus luteum removal (22 days).

**Anestrus in Postpartum Cows.**—Between February, 1955, and November, 1956, a survey was made of the Clemson dairy herd to determine the number of cows failing to show estrus by 70 to 90 days postpartum. Results are shown (table 3).

Although 14 per cent of the 567 cows had not shown estrus by 70 days postpartum, this problem had become partly resolved by 90 days postpartum when only 5 per cent of the cows were still anestrous. It should be noted, however, that whereas only 3 per cent of the crossbred cows were

TABLE 2—Treatment of Anestrus in Cows and Heifers Found Not Pregnant

Treatment	No. animals	Diagnosed pregnant within two inseminations		Time (days) from examination or corpus luteum removal to estrus		Time (days) from examination or corpus luteum removal to conception	
		(No.)	(%)	(av.)	(range)	(av.)	(range)
None	28	13	46	17	3-34	28	6-68
Corpus luteum expressed	10	5	50	16	2-56	22	6-56

the control group in which nothing was done other than to examine the ovaries, and the experimental group in which the corpora lutea were removed from the ovaries. All animals in both groups subsequently showed estrus and were bred at that time. Results are shown (table 2).

Although 50 per cent of the females from which a corpus luteum was removed became pregnant within two inseminations, 46 per cent of those in the control group also became pregnant. The average time (16 days) from corpus luteum removal to estrus in the treated females was similar to the average time (17 days) from examination to estrus in the control group. On the average, cows in the control group con-

anestrous by 90 days postpartum, 10 per cent of the Brown Swiss cows fell into this classification.

In order to obtain a clearer picture of what was happening in these cows prior to postpartum breeding, a group of 16 cows was selected for rectal examination of their reproductive tracts during the first 60 days postpartum. At first, the cows were examined starting at three days postpartum, but it was found that, in order to start all cows at a uniform time, it was necessary to wait until 21 days postpartum when the ovaries in all cows could be palpated. Ovaries of these cows were palpated twice weekly from 21 to 60 days postpartum.

At 21 days postpartum, corpora lutea were palpated in 6 of the 16 cows. Three of these 6 cows had shown estrus prior to 21 days postpartum. Corpora lutea were not palpated in 10 of the cows at 21 days postpartum although 3 of these had exhibited estrus prior to 21 days postpartum. Apparently, at least 9 of the 16 cows were "cycling" prior to 21 days postpartum.

By 60 days postpartum, 3 of the 16 cows (19%) failed to exhibit estrus. This is in fairly close agreement with the incidence

TABLE 3—Postpartum Anestrus in Cows in the Clemson Dairy Herd

Breed	No. calvings	Cows not showing estrus by 70 days postpartum		Cows not showing estrus by 90 days postpartum	
		(No.)	(%)	(No.)	(%)
Brown Swiss	62	12	19	6	10
Cross	149	14	9	5	3
Guernsey	159	20	13	5	4
Holstein-Friesian	179	34	19	14	8
Jersey	18	2	11	1	6
Totals and averages	567	82	14	31	5

of anestrus (14%) shown at 70 days (table 3). Of the 3 cows failing to show estrus by 60 days postpartum, 2 had quiet ovulations between 21 and 60 days postpartum, with one quiet ovulation followed by a corpus luteum which persisted for 29 days causing anestrus.

On the basis of these preliminary studies, it appeared that anestrus in the postpartum cows was due chiefly to quiet ovulations. Retention of corpora lutea and, possibly, inactive ovaries were also factors.

In an effort to offer some form of recommendation for management of postpartum anestrus cows, an experiment was designed involving 44 cows from December, 1956, to September, 1958. Cows having shown no signs of estrus by 70 days postpartum (infected cows excluded) were allotted to one of the four following groups: group 1—no rectal examination, no treatment; group 2—rectal examination of the ovaries at 70 days postpartum, no treatment; group 3—beginning at 70 days postpartum, twice weekly examination of the ovaries until the occurrence of estrus; and group 4—removal of the corpus luteum at 70 days postpartum.

Plans required that animals used in this experiment be assigned to groups 1, 2, 3, and 4 on a rotation basis. This was not possible, however, since 6 of the cows which should have gone into group 4 for corpus luteum removal did not have palpable corpora lutea on their ovaries and were assigned to other groups. The condition of the ovaries, therefore, for the four groups at the start of the experiment was as follows: group 1—no examination, not known; group 2—6 or 55 per cent of the cows with corpora lutea on their ovaries; group 3—2 or 20 per cent of the cows with corpora lutea on their ovaries; and group 4—all cows with corpora lutea on their ovaries. Cows were bred on first observed

heats. Results are shown (table 4).

From a study of this table, it is obvious that in attempting to compare methods of treatment, both the percentage of cows conceiving within two inseminations and the time required for conception to take place following examination or corpus luteum removal must be taken into account. With both of these factors considered, an initial rectal examination at 70 days postpartum, resulting in a 91 per cent conception rate occurring within an average of 24 days following examination, appeared to be the most effective of the four treatments involved. This conclusion might be questioned, but certainly neither frequent ovarian examination nor corpus luteum removal helped in the treatment of postpartum anestrus when compared with the other groups.

#### DISCUSSION

It is difficult to come to definite conclusions regarding work done on anestrus cows. Since it is impossible to create anestrus of any particular type, it must be studied as it occurs. Cows may be anestrus as a result of numerous factors such as quiet ovulations, infection, short estrous periods, unobserved estrous periods, embryonic mortality, retained corpora lutea, or inactive ovaries. To say that a given type of treatment is good for any one of these situations, infection excepted, is obviously misleading. Unfortunately, when an anestrus cow is brought to our attention, we are unable to establish a definite cause. Because of the conditions surrounding the anestrus cow, treatments of many types, such as injection of gonadotrophins or estrogens, ovarian massage, or corpus luteum removal, have been successful.

Probably more attention has been focused on the corpus luteum in anestrus than any other one factor. Whether one can

TABLE 4—Treatment of Anestrus in Cows at 70 Days Postpartum

Treatment	No. animals	Pregnant in two inseminations		Time (days) from initial exam or corpus luteum removal to estrus		Time (days) from exam or corpus luteum removal to conception)	
		(No.)	(%)	(av.)	(range)	(av.)	(range)
None	12	8	67	31	3-98*	34	3-116*
Initial rectal examination	11	10	91	21	2-73	24	3-84
Rectal examinations 2 times per week	10	7	70	17	4-37	49	4-100
Corpus luteum removal	11	8	73	27	3-72	40	3-72

\*Average time from 70 days postpartum to estrus or conception.



accurately discern between a normal corpus luteum of an unexpressed or expressed estrous cycle as compared to a retained corpus luteum is a question. One way in which a corpus luteum could truly be classified as "retained" is to continue palpation of the ovaries over a period of time following initial examination.<sup>1</sup>

It has been reported<sup>4</sup> that squeezing out the persistent corpora lutea effected cures in 80 per cent of the anestrous cows treated.

A significantly greater number (48%) of anestrous cows conceived within 30 days after corpus luteum removal as compared with the number (28%) that conceived within 30 days in an untreated control group.<sup>8</sup> One worker<sup>6</sup> removed the corpus luteum from 98 anestrous cows and recorded a 52 per cent conception rate on one service. At least a 50 per cent conception rate can be expected following heats induced by corpus luteum removal in anestrous cows.<sup>9</sup> Another writer<sup>12</sup> enucleated the corpora lutea from 133 anestrous cows and reported that 54.9 per cent became pregnant on the first induced heat, and that 77.4 per cent conceived within two heat periods. One investigator<sup>3</sup> discontinued mechanical treatments of ovaries in his work, because the treated cows showed no improvement over the controls in the percentage of pregnancies induced.

There is a need for clarification regarding the treatment of anestrus by corpus luteum removal. Since spontaneous recovery occurs frequently, the question remains how soon should estrus occur in the cow following corpus luteum removal to be strictly classified as being a result of corpus luteum removal.

One worker<sup>2</sup> expressed the corpora lutea from cows in midcycle and noticed that 90 per cent of 76 cows showed estrus within two to four days. Other investigators<sup>10</sup> expressed the corpora lutea from 1,522 cows where difficulties in detecting heat had occurred. They reported that estrus was induced in about 50 per cent of the cows within eight days after the operation. One report<sup>9</sup> indicated that approximately 75 per cent of the anestrous cows from which a corpus luteum has been removed will show estrus within one week. Another study<sup>8</sup> reported that 50 per cent of anestrous cows showed signs of estrus within ten days following corpus luteum removal as compared with a 32 per cent response for an untreated control group. By the end

of 30 days following corpus luteum removal, 83 per cent had exhibited estrus as compared with 80 per cent showing estrus in the control group.

One writer<sup>6</sup> removed the corpora lutea from 151 anestrous cows. Of these, 65 per cent showed estrus within 15 days after corpus luteum removal, and 82 per cent showed estrus within 30 days after corpus luteum removal. Another investigator<sup>12</sup> removed the corpus luteum from 166 anestrous cows and observed that 55 per cent of the cows came into estrus within two to four days after corpus luteum removal and 67 per cent of the cows came into estrus within two to seven days following corpus luteum removal.

Data in this report indicate that 18 per cent of control cows show estrus within four days following initial examination; 54 per cent, within 15 days; and 85 per cent, within 30 days. In the anestrous cows from which the corpus luteum was removed, 24 per cent showed estrus within four days following removal; 57 per cent, within 15 days; and 76 per cent, within 30 days. One investigator<sup>3</sup> indicated that the appearance of estrus within 30 days following corpus luteum removal constitutes a "positive response" to treatment.

Incomplete expression of the corpus luteum delays the appearance of estrus and adds to the confusion in evaluating this type of work. In addition, removal of the corpus luteum from a normally "cycling" cow could provide the investigator with an animal whose physiological response is quite different as compared with the response of an anestrous animal.<sup>2</sup> The work in this report questions the value of corpus luteum removal from only those cows which have been in anestrus.

#### SUMMARY AND CONCLUSIONS

1) A study was initiated in the Clemson College dairy herd to determine the incidence of anestrus in cows and heifers found not pregnant at the time of examination, and also to determine the incidence of anestrus in cows 70 to 90 days postpartum.

2) Of 249 heifers examined for pregnancy, 19 per cent were found not pregnant two months following insemination. Of these nonpregnant heifers, 57 per cent had palpable corpora lutea on their ovaries. Of 380 cows examined for pregnancy, 8 per cent were found not pregnant three months



following insemination. Of the nonpregnant cows, 59 per cent had corpora lutea on their ovaries.

3) Of 567 cows observed, 14 per cent had not shown signs of estrus by 70 days postpartum, and 5 per cent of the cows had not shown estrus by 90 days postpartum.

4) A total of 38 cows and heifers were placed on experiment for the treatment of anestrus in cows and heifers found not pregnant at the time of pregnancy examination (3 months following insemination in cows; 2 months following insemination in heifers). In the control group, 46 per cent of the animals conceived within two inseminations by an average time of 28 days following ovarian examination. In the experimental group, 50 per cent of the animals conceived within two inseminations by an average time of 22 days following corpus luteum removal.

5) Forty-four cows were placed on another experiment to study the effects of various treatments on anestrus in postpartum cows. Beginning at 70 days postpartum, anestrus cows were allotted to one of four groups: (1) no examination, no treatment; (2) initial examination, no treatment; (3) twice weekly examination of the ovaries until the occurrence of estrus; and (4) removal of the corpus luteum. The group in which the cows were given only an initial rectal examination had the highest resulting conception rate (91%) within two inseminations, and conceived at an earlier average time (24 days) following initial examination than did the other groups.

6) Based on the results of the research presented in this report, either the removal of a corpus luteum or periodic massage of the ovaries is of questionable value in treating anestrus.

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#### Retained Fetal Membranes in Cows

In a study of 80 cases of retained "after-birth" in cows of Holstein-Friesian origin, in Portugal, twin pregnancies, individual predisposition, insufficient uterine preparation, dystocia, and placentitis were found to be the most frequent causes. The lack of green feeds, with their carotene, probably was responsible for a higher rate of retention in certain months of the year. Retention was apparently not influenced by the length of the gestation period (208 to 314 days), the sex, the rate of twinning, or by which horn was gravid.

The retained membranes were usually manually removed 48 to 56 hours after parturition but, if not sufficiently macerated, removal was postponed another 24 hours. If removal was still inadvisable, the spontaneous detachment (8 or 9 days) was awaited. Uterine suppositories, consisting of charcoal and sulfathiazole or of antibiotics, were inserted between the membrane and the endometrium 24 hours after calving. Douching is considered harmful either before or after removal of the membranes.

In the affected cows (8.2% of 508 calvings) thus treated, estrus occurred 20 to 90 days after intervention in 89 per cent of the cases, conception occurred on first artificial insemination in 59 per cent, and the milk flow was improved or unchanged in 87 per cent.—*R. T. C. Guerreiro in Anais Escola Superior Med. Vet.*, 1, (1958): 35.

## Fracture Repair of Epiphyses with Complete Separation from the Diaphyses in Cats with the Jonas Splint

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EPIPHYSEAL FRACTURES, whether in man or animal, are a challenge to the orthopedic surgeon, as they are among the most difficult to reduce successfully. They can be divided into three main groups:<sup>4</sup> (1) those with complete or incomplete separation of the epiphysis from the diaphysis; (2) those in which the fracture line extends to the epiphyseal line; and those (3) in which the complete or incomplete separation of the epiphysis is associated with the true fracture of the diaphysis.

The prognosis in all these cases should be guarded, as the outcome of the repair will depend not only on the skill of the surgeon to approximate both fragments and keep them in good alignment and proper immobilization, but also on the degree of damage sustained by the surrounding muscles and impairment of the blood supply to the injured bone. The effect of the trauma on the growth and development of the affected bone in young animals is also an important factor. Since the bone grows in length at the epiphyses, the injured limb may become shortened if there is severe damage to either structure. In aged subjects, there may be retardation of the process of healing.

In a previous paper,<sup>1,2</sup> we described the repair of fractures of the diaphyses of the femur in 2 pups where the fractures extended to the distal epiphyseal line. The Jonas splint provided solid immobilization during the period of osteogenesis, and proved its value in growing animals because the unique spring mechanism allowed an automatic elongation of the splint as needed during additional growth of the bone. These were the type of fractures described in categories 2 and 3.

The selection of the appropriate splint is paramount to the success of this operation. Preliminary measurements of the diameter of the medullary canal and the length of the straight section of the femur are made with the aid of a radiograph.

We routinely autoclave several sizes of splints, and the final choice is made after the bones are exposed and the diameter and length of the medullary canal has been carefully measured with the appropriate reamer. In a true distal epiphyseal fracture, the medullary canal is present only in the proximal fragment, so an indentation must be made with a reamer or a drill into the epiphyseal bone for anchoring the point of the pin. Drilling into the epiphysis should follow in a straight line with the long axis of the medullary canal of the long fragment so that the epiphysis can be brought into perfect alignment with the diaphysis. This indentation has to be made carefully so as not to penetrate the articular surface of the stifle joint and invite ankylosis.

In all such fractures,<sup>3</sup> the spasm of the quadriceps femoris muscles exerts a strong pull on the proximal fragment which is liable to dislodge the point of the pin from its shallow depression in the epiphysis. In order to counteract this pull and achieve anchorage for the point of the pin in a cat, it is usually sufficient to select a splint which is about 1/3 inch longer than the combined length of the reamed-out straight section of the medullary canal of the femur and the depth of the drilled indentation into the distal epiphysis.

This report describes the repair of distal epiphyseal fractures in cats when there is complete epiphyseal-diaphyseal separation and much displacement.

### CASE 1

On Nov. 19, 1956, a 7-month-old cat, examined because of severe injury to the left hindleg following a car accident, was in traumatic shock and pain. There was extensive laceration on the lateral surface of the left hock and the articulating surfaces were exposed and grossly contaminated with sand and hair. A lateral radiograph (fig. 1) showed a separation at the distal epiphyseal cartilage. The proximal fragment was displaced cranial about 5 cm,

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Fig. 1—Fracture of the distal epiphysis of the left femur in a cat, with large separation (case 1).

and the distal fragment was attached to the stifle joint in extreme flexion.

The following day, the cat was anesthetized with sodium pentobarbital, and the skin from the trochanter major to below



Fig. 2—Seven days after reduction of the fracture shown in figure 1, there was perfect alignment of bones. Notice the point of the pin in the distal epiphysis and the rest of the extended splint in the proximal fragment (case 1).

the hock was shaved, disinfected, and draped for internal fixation. When the operative area is small, we prefer to sew a stockinette or skin towels to the incised skin instead of using towel forceps, which are in the way during the reduction.

The skin incision was made slightly anterior and parallel to a line between the trochanter and lateral epicondyle of the femur, extending in a curve to below the stifle joint. The exposed tensor fascia lata was divided with scissors and the underlying vastus lateralis muscle was separated from the biceps femoris by blunt dissection to expose the bone fragments for reduction.

A compressed splint (size S-3) was inserted into the reamed-out canal of the proximal fragment, and when the cotter pin was withdrawn, the released tension of the spring projected the pin into the indentation in the distal epiphysis and simultaneously shifted the sleeve deeper into the medullary canal of the proximal fragment to the extent that it had been reamed out. A radiograph was taken immediately after



Fig. 3—Seventy-seven days after reduction of the fracture shown in figure 1, the position of the splint was unchanged; repair was completed with solid homogeneous callus (case 1).



Fig. 4—Fracture of the distal epiphysis of the right femur in a cat, with separation of both fragments. (case 2).



Fig. 5—Reduction of the fracture shown in figure 4. The sleeve of the splint is in the proximal fragment. Only  $\frac{1}{4}$  inch of the pin projects out of the sleeve with the point in the distal fragment under  $\frac{3}{8}$  inch tension. Both fragments are well aligned. Notice the angulation of the stifle joint within the Thomas splint (case 2).



Fig. 6—Fifty-seven days after reduction of the fracture shown in figure 4. The splint is in the same position; there is no change in alignment. Repair is almost completed with dense callus. The patella is in good alignment.

the reduction to make sure that the splint was well seated. A radiograph (fig. 2) taken seven days after the operation showed a perfect alignment of the bones, with the full length of the sleeve and most of the projected pin in the proximal fragment; only the point of the pin was anchored in the distal epiphysis. The fracture line was clearly visible and the patella was in correct position.

Following insertion of the splint, the surrounding muscles were infiltrated with crystalline penicillin G. The tensor fascia lata was sutured with 000 medium chromic catgut, and the skin, with Supramid.\*

We provide additional immobilization for all epiphyseal fractures with a modified Thomas splint which is made to conform to the length and angulation of the limb in a walking position. The ring of the splint is padded with cotton and covered with a layer of waterproof adhesive tape to prevent absorption of urine. In order to counteract the anterior pull of the muscles on the proximal fragment and prevent dis-

\*Distributed by Jensen-Salsbery Laboratories, Kansas City, Mo.

lodgment of the pin from its shallow anchorage, 2-inch strips of waterproof adhesive tape are placed over the anterior surface of the proximal fragment above but close to the fracture line, and fastened under slight pressure to the posterior bar of the Thomas splint.

Postoperative care is important in all cases of internal fixation, but especially so with epiphyseal fractures. The animal should be handled as little as possible for the first week, and should be given penicillin for five to seven days before the skin sutures are removed. In this particular case, the Thomas splint was removed on the seventh day, and the treatment of the lacerated and contaminated hock was continued with applications of wet dressings and antibiotic ointments. The cat was given a high-protein diet supplemented with dicalcium phosphate in a vitamin preparation.

When the cat was discharged after two weeks, the hock joint and all abrasions and lacerations were healed and the cat was only slightly lame. A radiograph (fig. 3) taken 77 days after the operation showed both ends of the splint in proper position, with osteogenesis progressing satisfactorily. Both fragments were firmly fused at this early stage by a solid and homogeneous callus. There was no ankylosis or any restricted motion of the stifle joint.

#### CASE 2

On Jan. 3, 1958, a 2-year-old tomcat was examined after being struck by a car.



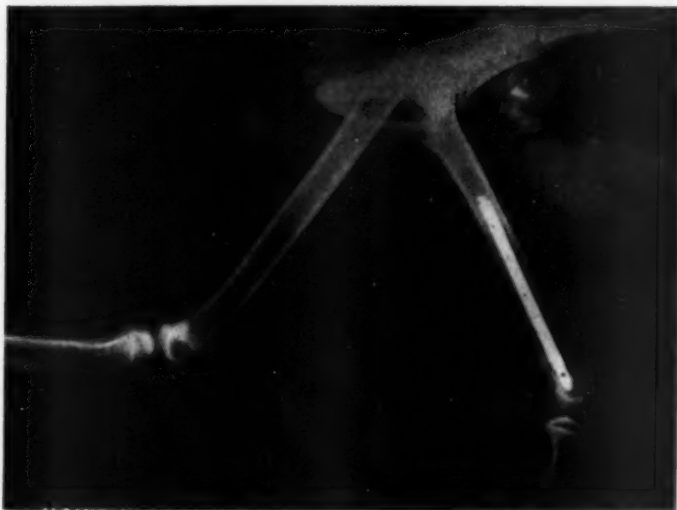
Fig. 7—Four months after reduction (case 2). Repair is completed with dense homogeneous callus.

Crepitation at the right stifle joint was associated with pain and edema. A radiograph (fig. 4) taken that day showed a true epiphyseal fracture with separation of the diaphysis from the distal epiphysis, displacement and overriding, and avulsion of the tibial tuberosity. The patella remained in the normal position anterior to the distal epiphysis.

The operation to expose the bone for the insertion of the splint was the same as described in case 1. However, instead of

Fig. 8—The same fracture nine and one half months after reduction (case 2).

There is no change





using a splint about 1/3 inch longer than the combined length of the straight section of the canal of the proximal fragment of the femur and the indentation in the distal epiphysis, we used a splint about 5/8 inch longer. We did this because the cat was extremely lively and the greater spring tension of the longer splint would give firmer anchorage to the point of the pin.

As an additional precaution, a properly angulated modified Thomas splint was applied to the fractured limb and taped as previously described. A radiograph (fig. 5) taken right after reduction shows the splint within the reamed-out canal of the proximal fragment, only a small section of the pin in the epiphysis, and the point of the pin well anchored in the drilled-out indentation. The fracture line is clearly visible, and there is good alignment between the diaphysis, epiphysis, and patella. The cat was hospitalized for three weeks, and upon discharge was using the fractured leg freely without discomfort or lameness.

Another radiograph (fig. 6) taken 57 days after reduction shows the splint in the same position as when inserted. There was no change in the alignment, and osteogenesis was progressing satisfactorily with the formation of a solid callus. The posterior portion of this callus appeared to be more dense than the anterior, where ossification was developing at a slower rate. A radiograph (fig. 7) taken four months after the operation was similar to the previous one except that the repair was then complete, with a dense and homogeneous callus.

The last radiograph (fig. 8) taken nine and a half months after reduction showed that the position of the splint had remained the same and there were not detrimental changes in the fractured bone.

#### SUMMARY AND CONCLUSIONS

This report describes the use, in 2 cats, of Jonas splints for immobilizing distal epiphyseal fractures of the femur when there is complete separation of the fragments.

To facilitate success in reducing epiphyseal fractures in cats:

- 1) Use a splint about 1/3 inch longer than the combined length of the reamed-out straight section of the medullary canal

of the femur and the depth of the drilled indentation into the distal epiphysis.

- 2) Provide additional external immobilization with a modified Thomas splint in order to counteract the pull of the quadriceps muscles on the proximal fragment.

- 3) Give good after-care and a high-protein diet supplemented with dicalcium phosphate in a vitamin preparation.

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#### Tetanus in Calves from Elastration

Of 42 calves in which castration was attempted by the rubber-band method, in South Africa, 14 developed fatal tetanus 13 to 17 days later. The first sign was an intermittent prolapse of the membrana nictitans, soon followed by an inability to nurse their dams. In 5, the wound was treated and they were given penicillin and chlorpromazine injections without benefit. All affected calves died in two to three days. In each case, the rubber ligature was completely embedded in a deep wound caused by inflammatory swelling immediately above the site. The presence of both an anaerobic state and necrotic tissue created ideal conditions for the development of *Clostridium tetani*. The wounds of all affected calves were moist and had a foul odor while those of unaffected calves were dry and odorless. The dry, necrotic scrotums of the latter were amputated immediately below the ligature and no more cases developed.—S. J. Van Rensburg in *J. South African V. M. A.*, (March, 1959): 29.

#### Swine Fetuses in Radiographs

Pregnancy could not be detected in sows by means of x rays until the ninety-second day of gestation.—*Vet. Bull. (June, 1959): Item 1956.*



## Bovine Hematology. I. Leukocyte Response to Acute Bovine Mastitis

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ROUTINE APPLICATION of hematology to clinical material available for teaching drew attention to a rather unique leukocyte picture—leukopenia, neutropenia, lymphopenia, and shifts to the left—in acute bovine mastitis. This paper summarizes observations made over a two-year period on 54 cows with acute nongangrenous mastitis (group 1) and 8 with gangrenous mastitis (group 2).

assistance, a number of cows undoubtedly were not given clinical examination until 12 to 48 hours after the onset.

The majority of the affected animals showed anorexia, decline in milk production, slight to severe depression, fast pulse rate (often 100 per minute), decreased rumination, and rectal temperatures, of 105 to 106 F., (108 in some cases). The involved mammary quarter(s) were gener-

TABLE 1—Total and Differential Leukocyte Counts in Normal Cows and Cows with Acute Mastitis

		Total leukocytes (No./cmm. blood)	Differential Leukocyte Count (No./cmm. blood)									Unclassified cells
Group	Range or mean		Pro-granulocytes	Myelocytes	Meta-myelocytes	Band neutrophils	Mature neutrophils	Lymphocytes	Monocytes	Eosinophils	Basophils	
	Range	4-12,000	-----	-----	-----	0-240	600-5,400	1,800-9,000	80-840	80-2,400	0-240	-----
(1) Normal cows	Mean	8,000	-----	-----	-----	40	2,240	4,640	320	720	40	-----
	Range (%)	-----	-----	-----	-----	0-2	15-45	45-75	2-7	2-20	0-2	-----
	Mean (%)	-----	-----	-----	-----	0.5	28	58	4	9	0.5	-----
(2) Group 1 54 cows with acute mastitis	Range	1,300-17,600	-----	0-1,460	0-2,700	0-4,672	0-8,944	1,000-12,500	0-1,590	0-1,245	0-767	-----
	Mean	6,140	-----	45	162	507	1,840	2,787	454	322	23	-----
	Range (%)	-----	-----	0-10.5	0-18.5	0-31.0	0-59.0	18.0-97.0	0-29.5	0-25.5	0-13.0	-----
	Mean (%)	-----	-----	0.7	2.6	8.3	29.9	45.5	7.4	5.2	0.4	-----
(2) Group 2 8 cows with gangrenous mastitis	Range	3,600-24,500	0-35	0-933	0-2,180	204-3,110	90-7,350	1,460-12,740	51-935	0-376	0-78	0-775
	Mean	8,550	4	338	655	1,038	1,869	3,837	436	150	14	209
	Range (%)	-----	0-0.5	0-9.5	0-31.0	4.5-23.0	2.5-33.0	25.0-52.0	1.0-19.0	0-6.5	0-1.5	0-12.0
	Mean (%)	-----	0.05	3.96	7.75	12.14	21.8	44.8	5.1	1.8	0.20	2.43

(1) = Based on a combination of literature reports and data accumulated in the clinical pathology department of the School of Veterinary Medicine; (2) = from blood collected on first clinical examination of each cow.

### CLINICAL FINDINGS

The 54 cows classified as having acute nongangrenous mastitis (group 1) had histories typical of acute onset, the owner stating that the cows were normal at the previous milking. Since many clients attempted home treatment before calling for

ally swollen and hot, and the secretion was distinctly abnormal. Most of the cows were treated with broad-spectrum antibiotics intravenously and intramammarily. In some of the less severe cases, the treatment was limited to local udder infusion. Generally, clinical signs subsided by the third or fourth day of treatment. Only 1 cow with nongangrenous acute mastitis died.

The history of the 8 cows with gangrenous mastitis was similar to that of the

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cows in group 1, but depression was more pronounced and the pulse was faster and weaker. The rectal temperature was generally 103 to 104 F. and, depending on duration of symptoms, was sometimes normal or subnormal. In addition, one or more mammary quarters became gangrenous. Treatment was similar to that given cows in group 1, but proved less successful; 5 of the 8 cows died.

## METHODS

Blood from the jugular vein was collected in 5-ml. quantities in vials containing dry ammonium and potassium oxalate.<sup>2</sup> Laboratory examination of the blood was started within an hour, or if a significant

delay was anticipated, films were prepared on slides for the differential leukocyte count, and the remainder of the blood was placed in the refrigerator.

Milk or exudate was collected from the involved mammary quarters for bacteriologic study. Milk samples were incubated before culturing; exudates were cultured both before and after incubation. The technique consisted of streaking a loopful of milk or exudate on the surface of a trypticose agar plate containing 5 per cent washed bovine erythrocytes. When bacterial growth was obtained, pure cultures were established in broth and the various organisms were identified by standard procedures.

## RESULTS

TABLE 2—Summary of Deviations from the Normal Leukocyte Picture as Seen in 54 Cows with Acute Nongangrenous Mastitis (Group 1) and 8 Cows with Typical Gangrenous Mastitis (Group 2)

Deviation in leukocyte picture*	Group 1		Group 2	
	(No.)	(%)	(No.)	(%)
Leukopenia	20	37.0	1	12.5
Leukocytosis	6	11.0	1	12.5
Absolute neutropenia	16	29.6	2	25.0
Relative neutropenia	9	16.6	2	25.0
Absolute neutrophilia	7	12.9	1	12.5
Relative neutrophilia	13	24.0	3	37.5
Absolute lymphopenia	14	26.0	2	25.0
Relative lymphopenia	18	33.3	5	62.5
Absolute lymphocytosis	1	2.0	1	12.5
Relative lymphocytosis	10	18.5	1	12.5
Shift to the left	34	63.0	8	100.0
Shift up to progranulocytes	0	0.0	1	12.5
Shift up to myelocytes	6	11.0	4	50.0
Shift up to metamyelocytes	20	37.0	2	25.0
Shift limited to band neutrophils 8 in excess of 2 per cent	15.0	1	12.5	

\*Terminology clarified

Leukopenia—total leukocyte count is less than 4,000 per cubic millimeter of blood.

Leukocytosis—total leukocyte count is in excess of 12,000/cmm.

Absolute neutropenia—the sum of the neutrophil series, progranulocyte through mature neutrophil, falls below 600 cells/cmm.

Relative neutropenia—the sum of the neutrophil series falls within the normal range, but is less than 15 per cent of the total count.

Absolute neutrophilia—the sum of the neutrophil series exceeds 5,400 cells/cmm.

Relative neutrophilia—the sum of the neutrophil series falls within the normal range, but is in excess of 45 per cent of the actual total count.

Absolute lymphopenia—the lymphocyte count falls below 1,800/cmm.

Relative lymphopenia—the lymphocyte count falls within the normal range, but is less than 45 per cent of the actual total count.

Absolute lymphocytosis—the lymphocyte count exceeds 9,000/cmm.

Relative lymphocytosis—the lymphocyte count falls within the normal range, but is more than 75 per cent of the actual total count.

Shift to the left—immature forms of the neutrophil series appear in peripheral blood in excess of 2 per cent band forms. The severity of a disease process is reflected by the magnitude of the left shift.

**Bacteriologic Data.**—Of the 54 cultures from cows in group 1, 26 failed to provide bacterial growth; this was presumed to be the result of treatment, by the owners, of the quarters with antibiotics before the samples were collected. Among the remaining 28 cases, 14 were single-organism infections and 14 were mixed infections. The single-organism infections were represented by *Escherichia coli*, *Micrococcus pyogenes*, *Streptococcus agalactiae*, *Streptococcus dysgalactiae*, unidentified streptococci, and coagulase-negative micrococci. The mixed infections included the same bacteria, except *Str. dysgalactiae*, and also *Aerobacter aerogenes* and *Corynebacterium pyogenes*. In the cases of mixed infection, two or three of the listed bacterial types were isolated from the same sample. *Micrococcus pyogenes* was associated with all cases of gangrenous mastitis.

**Leukocyte Response.**—Normal values for the leukocytes in the mature bovine animal are presented (table 1) in conjunction with the ranges and means for the leukocytes as found in cows with acute nongangrenous and gangrenous mastitis. The normal values are based on a combination of literature reports and data accumulated by the Clinical Pathology Department.<sup>5</sup>

Deviations in the leukocyte picture found in the 62 cases of acute mastitis are summarized (table 2). The data were from samples of blood collected during the first clinical examination of the cows (tables 1 and 2). Since the interval between onset of signs and the taking of blood for examination was varied and un-

TABLE 3—Detailed Data in Cows with Representative Cases of Acute Bovine Mastitis

Case No. and breed	Age (yr.)	Type of infection	Date	Percentage distribution of leukocyte types										Comments on clinical examination		
				Total leuko- cyte count (No./cmm.)	Myelocyte	Metamyelocyte	Bands	Neutrophils	Lymphocytes	Monocytes	Eosinophils	Basophils	Temperature (F.)	Pulse	Respiration	Other
GTS-6	8	A. aerogenes	3/8/57	1,300	.....	.....	1.0	19.0	77.0	3.0	.....	.....	108.8	108	58	Severe, responded to two treatments.
Jersey		M. progenes	3/9/57	2,850	.....	.....	.....	6.0	63.5	24.5	6.0	.....	102.2	80	28	
SD-520	5	Sterile	10/22/56	2,800	.....	0.5	10.0	5.5	62.0	9.0	13.0	.....	101.5	86	25	Moderately severe; re-
Guernsey		Sterile sample	10/24/56	8,000	.....	2.0	14.0	43.0	27.0	9.0	3.0	1.0	101.0	75	25	sponded to two treatments.
			10/2/56	2,950	.....	2.0	5.0	2.0	65.0	17.0	8.0	.....	104.8	100	100	Severe, responded slowly,
UCD-127			10/3/56	3,950	.....	3.0	9.5	4.0	63.5	18.0	2.0	.....	104.4	100	80	treated for 2 weeks con-
Holstein-	14	Esch. coli	10/8/56	4,450	.....	.....	.....	12.0	39.0	36.0	11.0	2.0	104.1	90	60	tinuously. Liver biopsy
Friesian			10/15/56	9,500	.....	.....	0.5	51.5	24.5	23.5	.....	.....	105.5	96	80	showed microabscesses.
			10/23/56	8,350	.....	.....	1.5	50.5	23.0	13.5	11.0	.....	103.0	86	24	
			11/23/56	7,050	.....	.....	.....	35.0	50.0	5.0	10.0	.....	101.4	80	24	
			3/12/57	1,800	.....	.....	1.0	2.0	83.0	12.0	2.0	.....	105.0	100	.....	Severe; did not respond to
UCD-65	10	Esch. coli	3/13/57	1,350	.....	.....	.....	1.0	85.0	6.0	8.0	.....	104.2	.....	.....	treatment. Liver biopsy
Jersey			3/14/57	2,850	.....	.....	.....	1.0	82.0	8.0	9.0	.....	104.8	.....	.....	showed severe lipidosis.
			3/15/57	3,250	14.0	20.0	5.0	0	51.0	7.0	3.0	.....	100.0	.....	.....	Animal died.
			3/16/57	6,300	0.0	7.0	.....	.....	84.0	9.0	.....	.....	100.0	.....	.....	
			3/18/57	7,800	4.0	23.0	8.0	7.0	51.0	7.0	.....	.....	101.4	.....	.....	
			5/20/58	5,600	.....	1.0	7.0	33.0	50.0	.....	.....	.....	103.0	80	32	Two quarters gangrenous;
FJH-451	3	M. progenes	5/21/58 a.m.	8,250	10.0	17.5	4.5	13.0	40.0	7.0	8.0	.....	101.5	100	28	responded to antibiotics
Holstein-		(gangrene)	5/21/58 p.m.	10,700	5.5	31.5	8.5	14.0	34.0	6.0	0.5	.....	.....	.....	.....	and mastectomy.
Friesian			5/22/58	9,000	3.5	5.5	23.0	24.5	35.0	3.5	4.0	.....	100.2	70	28	
			6/6/58	5,100	.....	.....	.....	20.0	66.5	10.0	3.0	.....	101.3	70	28	
UCVA	6	M. progenes (gangrene)	10/2/57	4,000	22.5	22.0	15.0	2.0	28.5	10.0	.....	.....	100.0	180	80	Severe gangrenous mastitis.
																Cow dead in 24 hours.

known, these data are considered representative of the situation as it would exist in a veterinary practice.

Detailed data in representative cases are shown (table 3). Several cases are included in which a series of blood samples was drawn in order to obtain a pattern of changes in total leukocytes and their differential distribution with the passage of time and increase in severity of clinical signs.

The 54 cows with acute nongangrenous mastitis had a range in total leukocyte count of 1,300 to 17,600, with a mean of 6,140 per cubic millimeter of blood. A marked leukopenia was observed in 37 per cent, and a shift to the left in 63 per cent, of these cows. The leukopenia was generally associated with both an absolute neutropenia and an absolute lymphopenia. With the passage of time, the number of cells composing the neutrophil series increased, bringing the total leukocyte count into the normal range of 4,000 to 12,000. In the more severe cases, the shift to the left was pronounced (table 3, UCD-65). An above-normal total leukocyte count was observed in only 11 per cent of the nongangrenous cases.

The 8 cows with gangrenous mastitis had a range in total leukocyte count of 3,600 to 24,500, with a mean of 8,550 cells per cmm. of blood. Actually, 75 per cent of the cows had total leukocyte counts in the normal range since only 1 had leukopenia and 1 showed leukocytosis. All 8 cows had a shift to the left that was generally much greater than that seen in the animals having nongangrenous acute mastitis.

#### DISCUSSION

An early marked leukopenia with shift to the left is an unusual response for a localized bacterial infection. This type of leukocytic pattern is common in generalized bacterial infections of man and animals and suggests a grave prognosis. That this is not necessarily the case in bovine mastitis is demonstrated by the fact that only 1 cow among 54 with acute nongangrenous mastitis died, of which 37 per cent showed marked leukopenia at first clinical examination.

There were 8 cases of acute gangrenous mastitis, and the differential leukocyte count was usually one of severe shift to the left, although absolute leukopenia was ob-

served in only 1 cow. However, 5 of these cows died.

The general pattern of leukocyte response in acute mastitis appears to be as follows: Within hours of the onset, a depression of both neutrophils and lymphocytes takes place. If this depression is great enough, the total leukocyte count may fall below the minimum normal of 4,000 per cmm. of blood. One count as low as 1,300 leukocytes per cmm. was recorded. In other cases, the total leukocyte count remains within the normal range, but in all probability, it is considerably lower than the normal for the particular animal in question, and thus a relative leukopenia exists.

The leukopenic state persists from a few hours to a few days, depending on the severity of the mastitis and the success of treatment. The neutrophils reappear, with a variable number of immature forms being released in the peripheral blood stream. The extent of this shift to the left is related to the severity of the mastitis. Thus, the shift is generally more extreme in gangrenous mastitis than in nongangrenous acute mastitis. With the appearance of the shift to the left, the total leukocyte count increases although it seldom exceeds the maximum normal count of 12,000 leukocytes per cmm. of blood. The differential leukocyte count returns to normal in a few days or a week as the generalized clinical signs associated with the mastitis subside. In animals that recover more slowly, the shift to the left persists for a longer period.

A search of the literature for reports on the hematology of mastitis revealed two brief comments on the occurrence of a transitory leukopenia with shift to the left in experimental mastitis in goats<sup>4</sup> and cattle.<sup>5</sup> More recently, others<sup>1</sup> recorded leukopenia in experimental *Klebsiella* and staphylococcal mastitis as well as in acute naturally occurring bovine mastitis.

#### SUMMARY

Total and differential leukocyte counts were performed on 62 cows with natural cases of acute bovine mastitis, of which 8 had typical gangrenous mastitis.

The observations suggest that, within hours of the onset signs of mastitis, there is a depression of neutrophils and lymphocytes that leads to a relative or absolute leukopenia. Within a few hours or days,

the total leukocyte count increases again as the neutrophils, many of which may be immature forms, are released into the circulation. The increase in neutrophils is seldom sufficient to produce an absolute leukocytosis or above-normal total leukocyte count. The magnitude of the shift to the left appears to be related to the severity of the generalized symptoms, and the leukocyte picture returns to normal as the systemic signs subside.

The severe leukopenia and shift to the left as seen in acute mastitis do not appear to be as useful for prognostication as in systemic bacterial infections. Only 1 of the 54 cows with acute nongangrenous mastitis died while 5 of the 8 cows with gangrenous mastitis died.

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### Chronic Fluorine Toxicosis in Cows

The effects of 30 and 50 p.p.m. of fluorine, fed as an NaF solution sprinkled over the feed of mature cows, at the University of Wisconsin, were studied through three lactations. The cows, 4 per group, were well nurtured but not allowed on pasture. In this study, there was an increased fluorine concentration in the bones, urine and, to some extent, in the soft tissues. There were no clinical signs of toxicosis, but at necropsy there was some exostosis on the long bones. Body weight and incisor teeth were not affected and lactation was not impaired.

In a previous, similar experiment through five lactations, starting with 2-year-old heifers, there had been a temporary appetite depression with a resulting reduction in both milk production and body

weight. Apparently age has an influence on the rate of skeletal fluorine metabolism.

A concentration of fluorine in the bones below 1,000 p.p.m. is considered normal, a concentration from 4,500 to 5,500 p.p.m. is usually associated with marginal toxicosis, and above that level, systemic reactions to fluorine are expected.—*J. Dai. Sci.* (June, 1959): 1063.

### Fluorosis in Equine Animals

Apparently horses have a higher threshold for intoxication with fluorides than do ruminants; lesions and clinical signs take longer to develop. Compared to ruminants, equine animals excrete a higher percentage of consumed fluorides in their feces, possibly because food passes more rapidly through the anterior portion of their digestive tract. Also, in the females, the metabolic equilibrium of mares is less frequently upset by gestation and lactation. When horses are affected, osteoporosis is more common than osteopetrosis.—*M. A. Mazel in Bul. Acad. vét. France* (April, 1959): 251.

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Fluoride in sufficient quantity to prevent 66 per cent of dental cavities occurs naturally in water supplies of 1,903 cities in the United States with a combined population of 7 million persons.—*Sci. News Letter* (Aug. 8, 1959): 94.

### Effects of Sodium Fluoride and of Hygromycin on Pigs

At the South Dakota Agricultural Experiment Station, 120 weanling pigs, in 20 lots of 6 pigs each, showed the best weight gains when fed hygromycin or chlortetracycline to a weight of 100 lb.; when both were fed, there was a synergistic effect and better gains. From 100 to 200 lb. weight, the greatest response was to chlortetracycline alone; hygromycin seemed to reduce feed consumption and, in some cases, the rate of gain.

Pigs treated for two days with sodium fluoride (0.5%) in their feed showed a reduction in the rate of gain (from 0.71 to 0.23 lb. per day) during treatment, then failed by 7 per cent to gain as fast from weaning to market weight as untreated pigs.—*J. Anim. Sci.* (Aug., 1959): 1067.



# Serological Survey of 659 Dogs for Leptospirosis Using the Capillary Tube Method

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A SURVEY OF DOGS for serological evidence of leptospirosis, using the agglutination-lysis test and inoculation of urine into hamsters, has been reported.<sup>1</sup> The survey indicated that 9 per cent of 106 dogs from our geographic area (East North-Central states) were serologically positive for *Leptospira* antibodies.

Because leptospirosis is transmissible to man, and since we use over 3,000 dogs per year for research purposes, we conducted a pilot survey of dogs as they were purchased to obtain an estimate of the number with leptospirosis-positive serum. The incidence of leptospirosis in dogs received from the Chicago Municipal Animal Shelter was compared with the incidence in dogs received from southern Illinois and several southern states.

## PROCEDURE

Five milliliters of blood was drawn aseptically from the femoral artery of each dog upon arrival. The sex, approximate age as determined by the appearance of the teeth,<sup>2</sup> and area of origin was recorded. The area of origin was recorded as "Chicago, Ill." if the dog was purchased from the Chicago Municipal Shelter, or as "South" if the dog was purchased from southern Illinois, Alabama, Tennessee, Mississippi, Kentucky, or Arkansas.

The serums were screened with the plate screen test<sup>3</sup> and all those showing positive reactions were then tested with the capillary tube test<sup>4</sup> using dilutions from 1:20 through 1:640. Three antigens were used for the plate and tube tests—*Leptospira canicola*, *Leptospira icterohaemorrhagiae*, and *Leptospira pomona*.

## RESULTS AND DISCUSSION

The incidence of positive reactions in the capillary tube test at 1:40 or higher to one or more of the three antigens is shown by area of origin, sex, and age (table 1),

and by area of origin and leptospiral type (table 2). The number of dogs positive at 1:160 to *L. canicola* is also shown (table 3).

The results in table 1 indicate that there is: (1) a higher incidence of leptospirosis in dogs received from Chicago than in dogs received from the South; (2) a higher incidence in males than in females; and (3) a higher incidence in older dogs than in young dogs. This higher incidence in males is consistent with the findings of some investigators,<sup>3-5</sup> but contrary to the findings of others.<sup>1</sup> Furthermore, the results in table 2 probably indicate that the incidence of *L. canicola* is the same in dogs from both areas, that the incidence of *L. icterohaemorrhagiae* is higher in dogs from Chicago than in dogs from the South, and that the incidence of *L. pomona* is negligible in dogs from both areas.

TABLE 1—Incidence of *Leptospira*-Positive Serums in Dogs Received at the University of Illinois from Chicago Pound and the South, Grouped According to Sex and Age

	Age (yr.)	Dogs	Positive		
		(No.)	(No.)	(%)	
CHICAGO					
Male	2 or less	30	8	26.7	
	2 to 5	131	46	35.1	
	5 or more	75	39	52.0	
Totals		236	93	39.4	
Female	2 or less	14	1	7.1	
	2 to 5	41	11	26.8	
	5 or more	20	11	55.0	
Totals		75	23	30.7	
Total Chicago		311	116	37.3	
SOUTH					
Male	2 or less	20	3	15.0	
	2 to 5	71	24	33.8	
	5 or more	76	27	35.5	
Totals		167	54	32.3	
Female	2 or less	26	3	11.5	
	2 to 5	84	15	17.9	
	5 or more	71	24	33.8	
Totals		181	42	23.2	
Total South		348	96	27.6	
Grand total		659	212	32.2	

From the Animal Hospital and Department of Microbiology, Chicago Professional Colleges, University of Illinois, Chicago.

TABLE 2—Comparison of Positive Serums of Dogs (Grouped by Area of Origin and by Leptospiral Type) Showing Tube Agglutinations of 1:40 or Higher

Area of origin	Dogs (No.)	Leptospiral type	Positive serums			
			(No.)*	(%)	(No.)**	(%)
Chicago	311	<i>L. canicola</i>	59	19.0	46.0	14.8
		<i>L. icterohaemorrhagiae</i>	100	32.2	68.5	22.0
		<i>L. pomona</i>	2	0.6	1.5	0.5
		Totals	161	51.8	116.0	37.3
South	348	<i>L. canicola</i>	59	17.0	53	15.2
		<i>L. icterohaemorrhagiae</i>	65	18.7	39	11.2
		<i>L. pomona</i>	10	2.9	4	1.1
		Totals	134	38.6	96	27.5

\*Each positive reaction listed, therefore some serums are listed more than once; \*\*each positive listed only once according to the strongest reaction.

One investigator<sup>6</sup> demonstrated a striking correlation between a positive capillary tube test (CT) at 1:40 and a positive agglutination-lysis test (ALT) at 1:100, which level was considered positive. The CT test at 1:160 correlated with the ALT test at 1:500.

Another investigator<sup>1</sup> found that 12 per cent of dogs with a positive reaction to the ALT test at 1:400 for *L. canicola* also had leptospiuria, while another investigator<sup>3</sup> showed that 52 per cent of dogs positive to an agglutination test over 1:100 were carriers. Our findings (table 3) revealed that 94 (14.3%) of the 659 dogs which we received were positive to the CT test at 1:160 for *L. canicola*.

TABLE 3—Number and Percentage of Dogs Positive to *Leptospira canicola* at 1:160 or Higher

Origin	Total dogs	Positive	
		(No.)	(%)
Chicago	311	47	15.1
South	348	47	13.5
Totals	659	94	14.3

On the basis of these facts, the incidence of *L. canicola* "shedders" in these dogs would be between 1.7 to 7.4 per cent. However, infected dogs may not always shed viable organisms in the urine, and since some nonreactors do shed organisms, it will be necessary to ascertain the true level of infection by animal inoculation or culture of specimens from the kidneys or urine of suspected dogs.

In view of this, it may be wise to wear rubber gloves and rubber aprons while handling new dogs, and to institute a routine screening program to eliminate possible carriers from the present dog

colony and to prevent introduction of new carriers into the colony.

In febrile infections of unknown origin in human beings known to have frequent contact with dogs, *Leptospira* should be kept in mind as a possible cause of the disease.

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- <sup>6</sup>Stoenner, H. G.: A Capillary Tube Test for Leptospirosis. *Am. J. Hyg.*, 57, (1953): 316-327.
- <sup>7</sup>Stoenner, H. G.: Leptospiral Antigens and the Combination Plate and Capillary Tube Test for the Serodiagnosis of Leptospirosis. Department of Health, Education and Welfare, Public Health Service, National Institutes of Health, National Microbiological Institute, Rocky Mountain Laboratory, Hamilton, Mont., Circ. 16, 1955.

#### Leptospirosis in a Newborn Calf

The finding of clinical signs of leptospirosis in a sick calf, 2 days old, caused an investigation to determine if a leptospiral organism could be isolated. Urine inoculated into chinchillas yielded leptospiras on post-inoculation day 5. The leptospiras were identified by cross-agglutination and agglutinin-absorption procedures as *Lepto-*

*spira canicola*. The calf serum showed a titer of 1:100 against *L. canicola*.

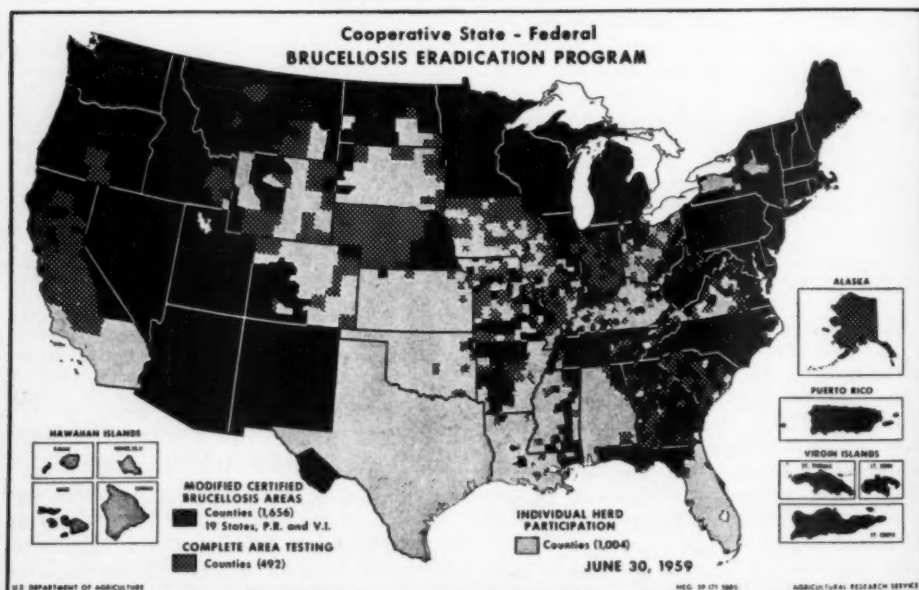
Other members of the herd, including the calf's dam, showed serological evidence that they may have been infected with *L. canicola*. The infection in the calf was probably contracted *in utero*. This is the first report of *L. canicola* infection in cattle in North America.—[L. W. Turner, C. S. Roberts, A. M. Wiggins, A. D. Alexander, and L. C. Murphy: *Leptospira Canicola Infection in a Newborn Calf*. *Am. J. Vet. Res.*, 19, (Oct., 1958): 780-784.]

### Experimental Bovine Leptospirosis

One of 7 pregnant heifers, experimentally infected with *Leptospira pomona*, aborted a 7-month-old fetus 29 days after infection. Leptospiras were not isolated from the aborted fetus or from any of the 6 fetuses, 4 to 7 months old, which were viable at the time the dams were killed.

Direct infection of the bovine fetus did not appear to be responsible for the abortions under these conditions. The pathogenesis of bovine leptospiral abortions can apparently be explained by alterations in the intimate relations between the maternal and fetal placental systems that are necessary to support fetal development. The microscopic lesions demonstrate a series of changes of increasing severity from the time of active infection in the dam until abortion occurs. These alterations in the placentas can interfere with the transfer of essential materials across the placental barrier, resulting in fetal inanition and death, followed by abortion.—[R. L. Morter, R. F. Langham, and E. V. Morse: *Experimental Leptospirosis. VI. Histopathology of the Bovine Placenta in Leptospira Pomona Infections*. *Am. J. Vet. Res.*, 19, (Oct., 1958): 785-791.]

### Progress in Brucellosis Eradication



The map above illustrates the progress made by the cooperative state-federal brucellosis eradication program to June 30, 1959, showing those counties that have attained the status of modified certified brucellosis areas; those with complete area testing, and the ones with individual herd participation.

For an evaluation of the brucellosis eradication program, see the editorial on facing page.

## Brucellosis Eradication

Guest Editorial

In spite of the remarkably fine progress made during the past few years, there are still those who refuse to believe that brucellosis can be eradicated. Some of these are veterinarians. This attitude, when expressed by a veterinarian, tends to influence and discourage livestock owners and raises doubts about future prospects for the program that are difficult to dispel.

### MEASUREMENT OF PROGRESS

When the national brucellosis situation is carefully examined, there are clear indications that the disease is being eradicated from significant numbers of herds throughout the country in an ever-increasing number of areas. The facts are these:

1) Brucellosis has been eradicated from several hundred thousand formerly infected herds throughout the United States.

2) Infection has been reduced from 11.4 per cent of all cattle blood-tested in 1934 to only 1.5 per cent in 1959. This is even more remarkable when we consider that the milk ring test has effectively channeled a substantial portion of blood-test activities, since 1952, into the ever-decreasing number of infected dairy herds.

3) Losses to the livestock industry have been reduced from an estimated \$100 million in 1947 to less than \$30 million in 1958. In this connection, it is significant that combined state and federal funds spent on this project since 1935 are the equivalent of only three and one-half years' estimated losses at the 1947 rate.

4) The incidence of human brucellosis has been reduced from 6,321 reported cases in 1947 to only 802 in 1958.

5) Less than one-third of the counties in the nation have yet to undertake a complete area-type program.

Progress in eradicating brucellosis may be measured also in a great many other ways. In 1958 alone, for example, more than 15 million cattle were blood-tested; 98 per cent of the 241,969 reactors found were promptly eliminated. Too, more than 6 million calves were vaccinated.

### CERTIFICATION

A system of certification has been established to give deserved recognition to areas which have made notable progress toward

eradication. Currently, 20 entire states, plus Puerto Rico and the Virgin Islands, have been declared Modified Certified Brucellosis Areas, and more are expected in the near future. With an additional 918 certified counties in 28 other states, there is a total of 1,687—more than 53 per cent of all counties in the United States. To qualify, modified certified areas cannot have more than 1 per cent animal or 5 per cent herd infection. Of the certified counties, 150 showed no reactors at all at the time of the last qualifying test.

### REASONS FOR PROGRESS

How has it been possible to make such tremendous progress in eliminating brucellosis? There are a great many reasons.

1) Countless far-sighted individuals in the livestock industry, related organizations, and local and national governments recognized that brucellosis eradication was a sound economic program with an attainable goal.

2) The assistance of approximately 6,000 practicing veterinarians has made it possible to meet most of the service requirements of this program.

3) Livestock producers have displayed an almost universal willingness to utilize all phases of the brucellosis program—blood test, elimination of reactors, vaccination of calves—to name a few.

4) Then, too, local and national public health agencies have helped by insisting upon wholesome dairy foods, free of disease-producing organisms.

### PROBLEMS TO BE MET

Although we are now at the half-way point, there are difficulties ahead. These are some of the problems:

1) There is an expressed desire on the part of some cattlemen to certify areas by calf vaccination only.

2) There is reluctance in certain areas to adopt a certification program because there are still states which insist on tests of imported cattle from negative herds in certified areas. This situation exists in spite of the fact that recent data show less than one reactor in 2,000 cattle tested following interstate shipment from certified areas.

3) Some range areas do not wish to be burdened with recurring tests of range herds in order to recertify counties. Here, again, vaccination only has been proposed as an alternate method.

4) Current limitations of available funds have slowed progress at a critical point in the eradication effort.

What can be done to overcome these problems? The following points are important in this regard:

1) Each segment of the livestock industry and related organizations must convince itself that eradication is not only practical and possible, but necessary to the economy of the nation.

2) Cattlemen must recognize that vaccination will not eradicate brucellosis. Research trials and extensive field investigations have shown that, on an average, vaccination provides about 65 per cent protection in the face of known exposures. Although vaccination provides a measure of control in most infected herds, a vaccination-only program has no end. With such a program, the livestock industry would not only continue to live with the disease, but would have to bear its costs—and losses—indefinitely.

3) A number of states have recently relaxed their testing requirements for cattle originating in certified areas. Provided safeguards in the existing program are not relaxed, others are contemplating similar action at an early date.

4) A new method of recertifying range areas is being put into operation in a number of western states. Basically, the plan calls for back-tagging and blood-testing cull

and dry cows going to slaughter. Blood-test results are credited back to the state, county, and herds of origin by means of the coded back tag. Provided 15 per cent of the area cow population is tested each three years, and infection rates are within prescribed limits, area certification can be maintained with a minimum of inconvenience to livestock owners. A vital part of this program is the requirement that 80 per cent of the female calves retained in the area each year be vaccinated. With the co-operation of all groups concerned, this procedure can be just as effective for screening beef herds as the ring test has proved to be in the case of dairy herds.

5) Fund limitations emphasize the need to continue field operations at maximum efficiency. With the momentum already generated, it is now possible to buy more actual eradication for each dollar spent than ever before.

#### PROSPECT FOR ERADICATION

Future prospects for the program are bright, but depend upon a determination of the eventual goal—control or eradication. Results over the past five years demonstrate conclusively that available tools and procedures are fully adequate to eradicate brucellosis from our livestock population if that is our desire. At this stage, it would seem most unwise and wasteful to settle for anything less. Veterinarians, as well as all other groups concerned, have a large stake in the eradication of brucellosis.—*C. K. Mingle, D.V.M., Chief Staff Officer, Brucellosis Eradication, Animal Disease Eradication Division, ARS, U.S.D.A., Washington, D. C.*

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### Age and Brucellosis Vaccination

The relative immunity resulting from vaccinating heifers with strain 19 *Brucella* vaccine (5 ml. subcutaneously) when they were 4 or 8 months old was compared. The immunity of each heifer was challenged by conjunctival inoculation with viable *Brucella* when the heifer became 4 months pregnant.

Of the 14 which had been vaccinated when 4 months old, none aborted; however, 3 became infected but calved normally. Of the 13 vaccinated when 8 months old, 1 aborted and 3 others became infected. Of the 4 unvaccinated control heifers, 3 aborted but the fourth resisted infection.

There seemed to be no significant difference in immunity induced by vaccination at 4 or at 8 months of age.—*H. L. Gilman and W. C. Wagner in Cornell Vet. (July, 1959): 399.*



## Abstracts

### Experimental Infection of Swine with *Brucella melitensis*

Shoats were exposed to four strains of *Brucella melitensis* (Mediterranean type) by spraying suspensions of organisms into the throat, by the subcutaneous, and intravenous routes. Oral exposure doses ranged from 27 million to 7,100 million organisms. Low agglutinin titers developed in 7 of the 8 pigs; bacteremia was not demonstrated; in only one instance was *Br. melitensis* isolated at necropsy 65 days after exposure.

The pigs exposed subcutaneously and intravenously received doses ranging from 3.1 billion to 102 billion organisms. Of the 8 shoats exposed subcutaneously, bacteremia was demonstrated in but 1 animal, 14 days after exposure. Significant agglutinin titers developed in all of the animals; of those receiving the largest inoculum, 3 had demonstrable agglutinin titers at time of necropsy five months after exposure, but *Brucella* was not recovered from any of the group at this time.

Infection was established in all of the 8 shoats exposed intravenously, with bacteremia ranging in duration from seven to 18 weeks. Significant agglutinin titers were present up to the time the animals were killed, 36 weeks after exposure. At necropsy, *Br. melitensis* was recovered from the lymph nodes of 3 pigs.

All isolates of the four strains recovered during the course of the study were examined to determine if there had been any alteration in character due to residence in swine. For each of the four strains, an isolate representing its maximum residency in swine tissue was tested for pathogenicity for guinea pigs. No alteration in species characteristics or in individual strain peculiarities was observed at any time, nor was infectivity for the guinea pig changed by prolonged residency in swine.—[G. A. Beal, D. B. Taylor, N. B. McCullough, R. M. Claffin, and L. M. Hutchings: *Experimental Infection of Swine with Brucella melitensis* (Mediterranean Type). *Am. J. Vet. Res.*, 20, (July, 1959): 634-641.]

### Virucidal Effect of Some Chemical Agents on Bluetongue Virus

The virucidal effect of five chemical agents—Roccal (alkyldimethylbenzyl ammonium chloride); Wescodyne (polyethoxypolypropoxypolyethoxy glycol-iodine complex, 7.75%; nonyl phenylether of polyethylene glycol-iodine complex, 7.75%; hydrogen chloride, 0.1% (providing 1.6% available iodine); and inert material, 84.4%); sodium hydroxide; sodium carbonate, and ethyl alcohol—was evaluated in tests involving the use of embryonating chicken eggs and sheep. The virus tested was adapted to embryonating chicken eggs and present in serum collected from a sheep reacting to an injection of the virus.

In each of the tests using embryonating eggs with the first four named chemical agents in four- to six-minute inactivation periods. Wescodyne at a concentration of 750 p.p.m. or greater was the only one that completely inactivated the virus.

In one test using sheep for the experimental animals, bluetongue virus in sheep serum was inactivated in a five-minute inactivation period by 750 p.p.m. of Wescodyne, 3 per cent sodium hydroxide, or 70 per cent ethyl alcohol in final concentration.—[B. R. McCrory, N. M. Foster, and R. C. Bay: *Virucidal Effect of Some Chemical Agents on Bluetongue Virus*. *Am. J. Vet. Res.*, 20, (July, 1959): 665-669.]

### Activity in Milk of a Staphylococcus, a Coliform Organism, and a Streptococcus

The response was explored weekly during a four-year period of milk samples exposed to the action of three bacteria recovered from bovine cows with mastitis. The method used with a *Staphylococcus* and a coliform organism was to add methylene blue, inoculate with the organism, followed by incubating and observing the time required to produce loss of color. Acid production during 24 hours' incubation furnished the measure of the response to the action of *Str. agalactiae*.

Variations were encountered in all 3 tests and, although similar trends frequently existed, this was not always the case. The monthly averages of the hours required to bring about color change tended to be lowest, and quantities of acid produced highest, during the summer, both measured indicating less resistance of the samples to the action of the bacteria at this time of year. In one year, this especially was pronounced in samples from cows turned out on pasture.

A temporary reduction was encountered in the oxidation-reduction potential of samples when cows first went on pasture.—[Norma A. Frank, W. D. Pounden, C. R. Weaver, and L. O. Gilmore: *Activity in Milk of a Mastitis-Producing Staphylococcus, a Coliform Organism, and Streptococcus Agalactiae*. *Am. J. Vet. Res.*, 20, (July, 1959): 736-741.]

### Toxic Effect of Sodium Metabisulfite and Sulfur Dioxide Gas in Cattle

A study on the lethal doses of sodium metabisulfite and sulfur dioxide gas in fistulated cattle indicates that this dose can be obtained only by forced feeding. Cattle fed 100 lb. of silage treated with sodium metabisulfite at the recommended rate consume approximately 45 Gm. of sulfite per day. One pregnant cow was given approximately twice this amount daily for 180 days with no deleterious effects.

Six hundred cattle fed metabisulfite-treated silage over a five-year period showed no ill effects. When massive doses were administered through rumen fistulas to 5 cattle, they died in 16 to 37 days. The pathological changes produced varied

considerably in each animal and with the preservative given.

In general, the more severe tissue changes were confined to the first portion of the digestive tract. The most consistent lesions were hemorrhages in the larynx and in the mucosa of the ventral wall of the trachea. Hematological data were highly variable. No significant change occurred in blood glucose, but blood urea nitrogen determinations in 3 animals revealed a definite drop in blood levels during the course of the experiment.

Residual bisulfite determination on the rumen contents of 1 animal indicated that a strong homeostasis existed until the animal apparently became saturated with the preservative. This occurred when the daily dose of 200 Gm. of metabisulfite was reached. Anorexia was a consistently observed sign of intoxication and it was concluded that cattle could not normally obtain a lethal dose unless they are force fed.—[A. J. Luedke, J. W. Bratzler, and H. W. Dunne: Sodium Metabisulfite and Sulfur Dioxide Gas (Silage Preservative) Poisoning in Cattle. *Am. J. Vet. Res.*, 20, (July, 1959): 690-696.]

#### Segmental Reflex in Pigs with Myoclonia Congenita

The segmental (S1) reflex in normal, affected, and recovered pigs has been characterized with respect to latency, duration, and comparative magnitude of the monosynaptic and multisynaptic responses. Effect of stimulus frequency on monosynaptic response differs from that in the cat. The multisynaptic response is often separated into two well-defined spikes designated as the second and third wave.

The nature of the segmental reflex response in pigs with tremor suggests increased excitability via two-neuron-arc pathways and decreased excitability via multineuronal pathways.—[M. W. Stromberg and R. L. Kittell: *Studies on Myoclonia Congenita. IV. The Segmental Reflex in Normal and Affected Pigs.* *Am. J. Vet. Res.*, 20, (July, 1959): 627-633.]

#### Udder Reactions to Sterilized Cultures and Filtrates

Infusion of killed broth cultures or cell suspensions of *Str. agalactiae* into 16 quarters with previous histories of mastitis produced transient mastitis attacks in two to four hours in 12. Broth cultures of four different udder isolates into seven similar quarters also produced reactions as did sterilized milk cultures and filtrates of *Str. agalactiae* in four additional quarters.

Killed broth cultures or cell suspensions of *Str. agalactiae* did not produce visible reaction on infusion into seven quarters that had no previous history of mastitis. Severe temporary reactions followed in two healthy quarters on infusion of a filtrate of *Str. agalactiae* milk culture (pH 4.6). Slightly less severe reactions followed in three pre-

viously affected quarters infused with similar filtrates.

Infusions of sterilized *Cryptococcus neoformans* culture in Sabourauds' broth did not produce visible reactions in either two healthy or two previously mastitic quarters.

Histopathologic examination of reacting quarters revealed conditions similar to those described for naturally occurring mastitis including edema, with fibrin and massive neutrophilic infiltration into interstitial tissues, ducts, and alveoli. It was suggested that attacks of mastitis may partially result from allergic reactions, with changes in the pH levels of udder secretions possibly contributing in initial attacks.—[V. L. Sanger, N. A. Frank, and W. D. Pounden: Udder Reactions to Sterilized Cultures and Filtrates. *Am. J. Vet. Res.*, 20, (July, 1959): 718-722.]

#### Study of Site Where Dog Acquired Coccidioidomycosis

A site in the desert (Arizona) where a dog apparently acquired coccidioidomycosis was studied for two years. Soil samples, 24 from the surface, 22 from the 6-inch depth and 17 from the 12-inch depth, all from areas not near rodent burrows, collected at intervals over a two-year period were all negative for *Coccidioides immitis*.

Of soil samples collected directly from rodent burrows, 12 of 73 from the surface, 14 of 68 from the 6-inch depth, and 4 of 57 from the 12-inch depth yielded *C. immitis*. Almost all positive samples had been collected in the September through December period.

Surface soil temperatures were too high in the early summer to be favorable for the growth of many microorganisms.

The summer rains probably provide moisture so that the few spores and mycelia remaining in the soil grow abundantly for a time. Dust storms in the late summer and early fall could thus be more infective, which could explain the greater number of human and animal cases of coccidioidomycosis reported in the area in the fall.—[Keith T. Madry: A Study of a Site in Arizona Where a Dog Apparently Acquired a *Coccidioides immitis* Infection. *Am. J. Vet. Res.*, 20, (July, 1959): 642-646.]

#### Morphology and Sporulation of Eimeria

This coccidium is reported for the first time from Montana, and is compared with previous descriptions. Of 194 fecal samples examined from 5 calves, the organism was seen in a total of eight samples from 2 of the calves. The size was 37.7 (32-40) x 25.1 (23-27.5)  $\mu$ ; sporocysts were 18.2 x 7.9  $\mu$ . Specific identification is based primarily on the shape, which is elliptical with relatively straight sides curving sharply near the poles, presence of polar cap and subpolar body, and the long sporulation time. *Eimeria bobmi* Supperer, 1952, is considered synonymous with *E. brasiliensis*. The organism has now been reported from Brazil,

India, Austria, Nigeria, and Alabama and Montana in the United States.—[William C. Marquardt: *The Morphology and Sporulation of the Oocysts of Eimeria Brasiliensis*, Torres and Ildefonso Ramos 1939, of *Cattle. Am. J. Vet. Res.*, 20, (July, 1959): 742-746.]

## Foreign Abstracts

### The Diagnosis, Prophylaxis, and Eradication of Hog Cholera

In a series of brief abstracts the following results are reported:

1) Nonsuppurative encephalitis was seen in 107 (77%) of 139 swine suspected of having cholera. It appeared after four days of illness. Of the 32 animals that did not have nonsuppurative encephalitis 24 had other lesions of cholera. Similar encephalitis lesions occur in animals with Aujeszky's disease, but not in erysipelas, paratyphoid infection, pasteurellosis, or listeriosis.

2) Treatment of the whole herd of swine with anti-hog cholera serum did not alone stop outbreaks of cholera. Swine that did not have a fever were isolated and vaccinated twice with crystal violet vaccine. There was a 1 or 2 per cent morbidity in swine vaccinated during the incubation period. Vaccination with this vaccine was not effective in 10-day-old pigs.

3) In an outbreak of cholera on a large swine farm with 45 separate herds, anti-hog cholera serum was given to all swine in the 17 herds in which the disease had appeared, and to all young pigs. Crystal violet vaccine was given to all other breeding stock and feeder swine. Because this did not stop the losses completely, 8,916 swine were vaccinated with dried lapinized virus when they were moved to winter quarters. Two to five days after vaccination a reaction occurred, which was much more severe in animals previously treated with the antiserum only than in those that had been given crystal violet vaccine. Morbidity of adult swine ceased, but in 15 to 20 days mass morbidity occurred in the young pigs. This was attributed to secondary Salmonella and Pasteurella infections and was treated with specific antisera for those infections. Clinically normal pigs were revaccinated with crystal violet vaccine, and no more swine sickened.

4) On another farm, cholera occurred when pigs previously immunized with antiserum were soon afterward given crystal violet vaccine; also in one to four months after repeated vaccination with crystal violet vaccine. The disease was controlled after lapinized virus vaccine was used, but severe reactions occurred after vaccination of pigs 3 to 4 weeks of age. Of the 847 swine vaccinated with lapinized virus, 537 were young pigs, 46 of which showed clinical reactions. They were treated with anti-hog cholera serum and streptomycin but 3 died.

5) In a comparative test of crystal violet vac-

cination methods, three groups of 6 pigs each were vaccinated twice, with a seven-day interval. The injections were made in the margin of the ear. Pigs in group 1 were each given two 1-ml. doses subcutaneously; pigs in group 2, two 2-ml. doses subcutaneously; and those in group 3, two 1-ml. doses intradermally.

The immunity of these pigs and 4 controls was challenged with virus 28 days after the last vaccination. All of the animals showed signs of cholera for an average duration of four to five days. All 4 controls died in six to 12 days. Four vaccinated pigs died—2 in group 2 and 1 each in groups 1 and 3.

6) Lapinized virus was used on two farms threatened with hog cholera but free from clinical signs of the disease. On one farm where the swine had been given crystal violet vaccine, a single dose of lapinized virus without serum was used. Reactions occurred in ten to 26 days and lasted three to four days. No cholera occurred. On the second farm, the first dose of lapinized virus was given simultaneously with anti-hog cholera serum. Two animals became sick in seven to ten days and 1 died. A second dose of vaccine alone was given two weeks later and was followed in ten to 12 days by a febrile reaction and decreased appetite in 13 per cent of the animals. No further illness occurred.

On a third farm, cholera had been present for one month and 47.5 per cent of the swine had died or been killed. All the apparently normal pigs were given heavy doses of serum and, three days later, were given a dose of lapinized virus vaccine, followed by a second dose 15 days later. These animals continued to sicken until 23 days after the last vaccination, with a loss of 43 per cent of those vaccinated.

On a fourth farm, cholera had been present for 22 days with a 57.6 per cent mortality. The remaining swine were given serum and lapinized virus vaccine simultaneously. Many of the sick ones and all of the suckling pigs died. Some pregnant sows aborted.

7) Hog cholera was eradicated in a district by the following measures. Temperatures of all animals in each herd were taken and only those with normal temperatures were vaccinated. Crystal violet vaccine (1 ml., repeated in 7 days) was given intradermally to 33,000 swine. At the time of vaccination, the animals were washed with caustic soda, their feet were cleaned and they were moved to uninfected quarters. The temperatures were then taken daily for 15 days and sick pigs were removed immediately. Their quarters were disinfected daily and quarantine was maintained.

8) In an experiment with 24 pigs, 75 to 90 days old and weighing about 40 lb., those vaccinated with crystal violet vaccine alone, either with 5 ml. subcutaneously or 1 ml. intradermally, were immune to later virus challenge. Those that were given anti-hog cholera serum, either with the vaccine or 15 days before vaccination, died.—[J. A. Rostovtseva: *The Diagnosis, Prophylaxis, and*

*Eradication of Hog Cholera. Veterinariya*, 36, (Feb., 1959): 57-62.]—ROBERT E. HABEL.

### Toxoplasma in the Eye of a Dog

The authors found *Toxoplasma* organisms in the retina and optic nerve of the enucleated eye of a dog. The associated pathologic changes were retinitis, iridocyclitis, and optic neuritis. Although this finding has not been reported before in natural infection of dogs, they point out the similarity of the lesions to those of natural toxoplasmosis of chickens, and experimental infection of rabbits and hamsters. Toxoplasmosis should be suspected when such changes are diagnosed clinically in dogs.—[C. N. Barron and L. Z. Saunders: *Ein Fall von intraokulärer Toxoplasmosis beim Hund (A Case of Toxoplasmosis in the Eye of a Dog)*. Schweiz. Arch. Tierheilk., 101, (1959): 349-353.]

## Books and Reports

### DDT in Human and Veterinary Medicine

This book is the second of a three-volume series on the subject of the insecticide dichlorodiphenyl-trichloroethane (DDT) and its significance, prepared under the general editorship of P. Müller. The present volume was edited by S. W. Simmons. The three contributors, S. W. Simmons, W. J. Hayes, Jr., and E. F. Knipling, are highly competent authorities in their assigned subjects. Each has prepared an excellent discussion.

The book covers the pharmacology and toxicology, human and veterinary uses of DDT, making use of 1,556 references to literature published throughout the world.

Veterinarians will find the section on veterinary uses the more directly useful in practice, but will certainly find the other two sections a valuable reference in answering questions for their clients.

For researchers in the fields discussed, this volume is an excellent review of world literature.—[DDT; *Human and Veterinary Medicine*. Edited by S. W. Simmons and P. Müller. 570 pages; 63 figures; 65 tables. Birkhauser Verlag, Basel, Switzerland and Stuttgart, Germany. 1959. \$16.00.]—R. D. RADELEFF.

### Mycoses of Man and Animals

This book is the English translation of the third part of the second edition of the well-known French work "Précis de Mycologie" by Langeron and Vanbreuseghem which was published in 1952. The other two sections of the "Précis de Mycologie," covering general aspects of mycology and techniques, have not been included in this book.

The author, an eminent Belgian medical mycologist, has presented a wealth of valuable information in this volume. However, the book's usefulness would have been immeasurably enhanced had

the author brought the subject matter up to date. The recent rapid advances in medical mycology have so added to our over-all knowledge of this field that a book written in 1952 is essentially out of date.

The text is divided into 17 chapters covering the superficial, cutaneous, subcutaneous, and systemic mycoses. The chapter format has been arranged in a logical manner and follows a definite teaching pattern. The text is well indexed and the author includes a valuable list of references after each chapter, but none are later than 1952.

The book is of convenient size and is printed on good quality glossy paper. On the whole, the illustrations are clear and well selected.

Objection can be taken to the taxonomic scheme and nomenclature stressed for the dermatophytes. The author classifies the ringworm fungi into five genera as follows: *Ctenomyces*, *Sabouraudites*, *Trichophyton*, *Langeronia*, and *Epidermophyton*. Most American and many foreign authors follow Emmons' classification of dermatophytes which employs the genera *Microsporum*, *Trichophyton*, and *Epidermophyton*. This taxonomic variance makes for confusion, unless the reader is well fortified by a good basic knowledge of the field.

On the whole, the book is written in a clear, interesting manner. The translator, Dr. J. Wilkinson, deserves praise for the skill he has exercised in preparing this literal English rendition of a French text.

In spite of its regrettable shortcoming of obsolescence, the book should serve as a useful reference for English-speaking workers in the field of medical mycology. Its value for veterinarians or students of veterinary mycology is limited, since the mycotic diseases in lower animal hosts are not covered in sufficient detail.—[*Mycoses of Man and Animals*. By R. Vanbreuseghem. 235 pages; illustrated. Charles C Thomas, Springfield, Ill. 1959. Price \$10.50.]—WILLIAM KAPLAN.

### Handbook of Physiology

A multi-volume work on physiology has been undertaken by the American Physiological Society and this is the first volume to be published. Their aim is to provide a comprehensive survey of modern concepts and experimental findings pertaining to physiology through a plan utilizing section editors and authors of international repute.

Neurophysiology, having undergone the most marked development in recent years, was chosen to be the first section published. This book, along with its two successive volumes, should provide advanced students, teachers, and research workers with the material they need for critical study of the current neurophysiological literature and should be available, in veterinary school libraries, for reference use by undergraduates as well. Paper, print, and binding are of exceptional quality.—[*Handbook of Physiology*. Edited by John Field. Vol. 1. 779 pages; illustrated. Williams & Wilkins Co., Baltimore 2, Md. 1959. Price \$22.00.]



# THE NEWS

## World Veterinary Poultry Association Formed

During the XVth International Veterinary Congress (now World Veterinary Congress) in Madrid last May, a number of veterinarians, who have been interested in veterinary poultry association activities in their respective countries, met and formalized the organization of the *World Veterinary Poultry Association*, as one of the specialist groups to be affiliated with the World Veterinary Association and its Congresses (see the JOURNAL, Oct. 15, 1959, p. 443).

Twelve countries were represented in the organizational meeting: Austria, Great Britain, France, West Germany, Italy, Netherlands, Norway, Portugal, Spain, Sweden, U.S.A., and the U.S.S.R.

Draft statutes to govern the W.V.P.A. which had been previously recommended by the Permanent Committee of the I.V.C. were adopted. Prof. L. de Blicke of the Netherlands who has been active in the exploratory stages of joining a World Veterinary Poultry Association, was unanimously elected as its first president.

Other officers are: Prof. A. Brion, France, and Prof. P. Levine, U.S.A., vice-presidents; Dr. R. F. Gordon, Great Britain, secretary; and Dr. W. M. McKay, Great Britain, assistant secretary and treasurer.

Some 50 veterinarians attended this meeting. Those from the United States were: Drs. K. L. Bullis, William R. Hinshaw, P.P. Levine, and D.V. Zander.

S/PROF. DR. JAC. JANSEN, *Secretary, World Veterinary Association.*

## Dr. C. A. Manthei Appointed Assistant Director to Dr. Hagan at New Animal Disease Laboratory in Iowa

Dr. Chester A. Manthei (MSU '34) was appointed assistant director for research at the National Animal Disease Laboratory in Ames, Iowa, on April 19, 1959. He has been head of the section on bacterial and mycotic diseases in both the pathological and the animal disease and parasite research divisions since 1952.

Joining the former B.A.I. in 1937, Dr. Manthei has conducted research on many bacterial and viral diseases. Recognized world-wide as an authority on brucellosis, he was appointed to the FAO/WHO Expert Panel on Brucellosis in 1950; elected to the presidency of the Pan American Brucellosis Congress in 1957; and received the Borden Award administered by the AVMA in 1958 (see the JOURNAL, Oct. 15, 1959, p. 409). Dr. Manthei also pioneered the development of the Aftosa vaccine

with the Mexican-United States Aftosa Commission in Mexico.

He is the author or co-author of over 35 scientific papers including chapters in the following



Dr. Chester A. Manthei

books: "Swine Diseases" and "Animal Diseases" published in 1958 and 1959 respectively. His selection as assistant to Dr. W. A. Hagan (see the JOURNAL, Feb. 1, 1959, p. 151) at the new laboratory was made in recognition of his ability as a scientist, administrator, and teacher in the field of research on diseases of animals.

S/EDWIN R. GOODE, JR., *Acting Director.*

## A National Animal Health Center Established

The National Animal Health Center, established in August, 1959, is currently headquartered in Washington, D.C., at 3146 Connecticut Ave. It is designed to serve the public in the manner of the National Institutes of Health.

Construction of a modern three-storied building within the National Capitol area is being planned for sometime late in 1960. To ultimately cost \$1.5 million, the new Center will provide for study and research ranging from the babyhood growing pains of young animals to geriatrics. Diagnostic and



clinical laboratories there will be designed to provide the services which are now largely supplied by laboratories covering human medicine.

Facilities will aid study and training in certain highly specialized areas of veterinary medicine such as isotopic therapy for cancer, orthopedic surgery, allergies, and infectious diseases.

Current plans call for a closed-circuit or scrambled television channel, emanating from an amphitheater studio for both demonstration and instruction. A memorial lending library will also be an integral part of the Center. It will contain material of interest to veterinarians, breeders, and to the animal-owning public.

Information on technical subjects, as well as pedigrees, genetics, training, and other subjects will also be available. In fact, one of the functions of the Center, will be to develop, coordinate, and disseminate information on animal health problems.

The Center will be headed by Dr. Erven A. Ross (KSC '46), Washington, D.C., who is with the Department of State's Economic Assistance Program.

## AMONG THE STATES AND PROVINCES

### California

**State Association Now Has a House of Delegates Form of Government.**—The California V.M.A. approved a House of Delegates form of government, patterned after that of the AVMA, at its seventy-first annual meeting in Santa Monica, June 23-25, 1959. The first meeting of the House is scheduled for Jan. 31, 1960, just prior to its midwinter conference, February 1-3, in Davis.

Following is a resume of the Association's new governing body:

Twenty constituent associations are represented by a delegate or delegates, depending upon the number of members in each organization.

Constituent associations are represented as follows:

100 members or less....	1 delegate, 1 alternate
101 to 200 members....	2 dele- gates, 2 alternates
201 to 300 members....	3 dele- gates, 3 alternates
301 to 400 members....	4 dele- gates, 4 alternates
401 to 500 members....	5 dele- gates, 5 alternates

Representing a constituent association each delegate's vote will count as follows:  
25 members or less.....1 vote

26 to 50 members.....2 votes

51 to 75 members.....3 votes

76 to 100 members.....4 votes

No single delegate or alternate delegate shall represent more than 100 members or have more than four votes.

Should the constituent associations become larger, they shall be represented at the ratio of one delegate and one alternate for each 100 members.

s/KENNETH HUMPHREYS, *Executive Secretary.*

### District of Columbia

**Dr. Osteen Becomes an Assistant to the Director at A.D.P. in Washington, D. C.**—Dr. Oswald L. Osteen (GA '28) has recently been made assistant to the director of the Animal Disease and Parasite Research Division, ARS, U.S.D.A., for coordinating and evaluating research activities directly relating to diseases and parasites of poultry.

Dr. Osteen joined the Department in 1932. With the exception of two years in Amsterdam, Holland, as chief of the European Mission on foot-and-mouth disease, he has conducted intensified research on Newcastle Disease, air-sac infection, and ornithosis of poultry, at the Animal Disease Station in Beltsville, Md.

s/EDWIN R. GOODE, JR., *Acting Director.*

### Indiana

**Women's Auxiliary.**—The monthly meeting of the Women's Auxiliary to the Calumet Area V.M.A. was held on April 2, 1959, at Wellman's Corral in Valparaiso.

The April program was given by three representatives of the Crown Point League of Women Voters. The recently elected president, Mrs. Paul Williams, Hobart, appointed the following committees: Membership—Mrs. Bernard Meyerowitz, Valparaiso; Public Relations—Mrs. Bruce Sharp, Hobart, chairman; and Mrs. David Cooley, Munster; Program—Mrs. Simon Goodman, Crown Point, chairman; Mrs. Cooley; Mrs. Meyerowitz; and Mrs. John McAfee, Valparaiso.

During the March meeting, the Auxiliary voted to make contributions to the Research Fund and the Student Loan Fund.

The May program featured a film on water conservation.

s/MRS. BRUCE H. SHARP, *Chairman, Public Relations Committee.*

### Louisiana

**State Association.**—Newly elected officers of the Louisiana V.M.A. are: O. C. Granzin, Baton Rouge, president; Walter Ernst, Monroe, vice-president; Robert K. Morris, Lake

Charles, secretary; and Henry Melius, Metairie, treasurer.

The following members of the association were given a lifetime membership: Drs. G. H. Leach, Opelousas; J. I. Martin, Baton Rouge; A. D. Kendrick, Shreveport; and H. H. Baur, Monroe.

s/ROBERT K. MORRIS, *Secretary*.

• • •

**Women's Auxiliary.**—The Women's Auxiliary to the Louisiana V.M.A. met in conjunction with the eighth annual summer conference of the L.V.M.A. June 21-23, in Monroe. Thirty-four members were present at the luncheon meeting held in the Highland Park Country Club. Mrs. Henry Melius, of New Orleans, president, presided.

Reports were given by Mrs. R. B. Lank, Baton Rouge, secretary-treasurer, and Mrs. W. T. Oglesby, Baton Rouge, state membership chairman. Mrs. Oglesby reported a total of 107 state members.

Mrs. Philip Amy, Eunice, public relation chairman, again explained the importance of the clipping service and requested more in the future. She also provided 500 booklets of "Veterinary Medicine As A Career" for distribution in high school libraries throughout the state.

Dr. E. J. Baronne (TEX '59), Bunkie, received the Auxiliary's outstanding Louisiana student award. This cash award is presented annually.

Mrs. Walter Ernst, Monroe, entertained the auxiliary at a coffee party in her home.

s/MRS. PHILIP AMY, *Public Relation Chairman*.

## Maryland

**Dr. A. A. Holbrook Chosen as a Principal Scientist of Virological Investigations at A.D.P. Division in Maryland.**—Dr. Allie A. Holbrook (TEX '47) has recently been designated as a principal scientist in virological investigations at the Animal Disease and Parasite Research Division, ARS, U.S.D.A., Animal Disease Station, Beltsville, Md.

Dr. Holbrook has been a member of the research team conducting work on problems concerned with vesicular diseases, giving special emphasis to vesicular stomatitis of swine. He joined the Department in 1949.

Dr. Holbrook will transfer his research activities to the new National Animal Disease Laboratory in Ames, Iowa, upon its completion (scheduled for November, 1960).

s/EDWIN R. GOODE, JR., *Acting Director*.

## Nevada

**Nevada-Southern California Associations Hold Symposium.**—October 25-27, the Nevada and Southern California Associations met at the Desert Inn in Las Vegas, for a symposium that included topics of interest to both large and small animal practitioners.

Speakers included: Drs. Grant Misener, Chicago, Ill.; J. Kenneth Bone, Chicago, Ill.; Irving Roberts, Oakland, Calif.; Alan Edmondson, Pasadena, Calif.; Richard Ott, Pullman, Wash.; and William Gay, Woodstock, Ill.

s/MR. H. DON MAHAN, *Executive Secretary*,  
*Southern California V.M.A.*

## Oklahoma

**New Roster for the Tulsa Small Animal Association.**—The Tulsa Association of Small Animal Veterinarians recently elected the following new officers: Drs. Fred Hutton, chairman; and Dr. R. H. Featherston, 3129 South Winston, Tulsa 5, secretary.

Elected to the executive board were: Drs. Ralph Grogan; and W. J. Speer.

s/R. H. FEATHERSTON, *Secretary*.

## Utah

**Dr. Binns Is New Director of Animal Disease Division in Utah.**—Dr. Wayne Binns (ISC '38), a nationally recognized authority on plants poisonous to livestock, has recently been selected director of the Animal Disease and Parasite Research Division Laboratory in Logan.

Dr. Binns joined the staff of the A.D.P. Research Division in 1952. In 1958, he was chosen as Outstanding Veterinarian by the Utah V.M.A., in recognition of his contribution to the economy of the large sheep raising industry of the Rocky Mountain area.

This laboratory conducts highly specialized research investigations on range plants to determine their toxicity to livestock as well as the practical means of destroying these plants without damage to the usefulness of pastures and forage crops.

s/EDWIN R. GOODE, JR., *Acting Director*.

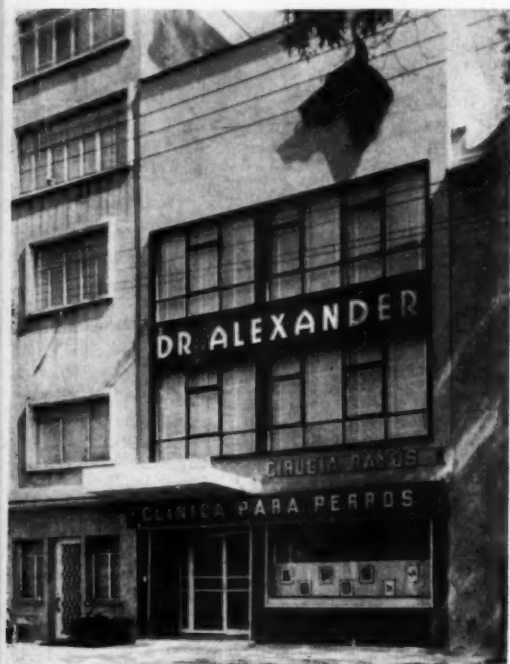
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## FOREIGN NEWS

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### Mexico

**Dr. Alexander—Veterinarian Extraordinaire.**—Dr. Alfonso Alexander (MSU '43), secretary of the Department of Agriculture and Animal Husbandry, successfully combines the life of a small animal practitioner, researcher, manufacturer, and part-time teacher—with time left to participate in association affairs on a national and international basis.



Pictured above is Dr. Alfonso Alexander's modern office in Mexico City.

Interested in canine nutrition, Dr. Alexander has looked into the prevalence of canine dermatitis and found that this disease can largely be attributed to faulty diet. As a consequence, he has developed his own dog food and now produces it for wide-spread use.

In addition, he is a part-time professor of surgery in the School of Veterinary Medicine at the University of Mexico and represents his country as corresponding secretary for the AVMA.

He is also currently serving as president of the Mexico V.M.A. This Association has a membership of 400 and meets every two years.

Last summer, Dr. Alexander attended the XVth International Congress in Madrid and visited many of the European veterinary schools.

## STATE BOARD EXAMINATIONS

**TEXAS**—Jan. 11-13, 1960, Austin. The completed application must be received in the Board office not later than 30 days before the examination date. Requests for information and applications should be sent to: Mr. T. D. Weaver, Executive Secretary, Texas State Board of Veterinary Medical Examiners, 207 Capital National Bank Building, Austin 16, Texas.

## DEATHS

Star indicates member of AVMA

**Richard W. Dagley** (MCK '15), 63, Chicago, Ill., died July 14, 1959, in the Edgewater Hospital there.

Dr. Dagley had had offices at his home for the past 18 years.

★**Heinz Goldman** (BRN '38), 45, Kansas City, Mo., was killed in a traffic accident in Tours, France, July 22, 1959. He was vacationing with his wife and son at the time of his death.

Dr. Goldman was born and educated in Switzerland. Since his arrival in the United States and Kansas City in 1938, he operated a practice at his home and, since World War II, at his own hospital, the Brookside Animal Clinic.

The Goldman family sailed for Europe on May 18 and had conducted a motor trip through Spain, Italy, Poland, Czechoslovakia, and France when the accident occurred. They had planned to go on to Paris and sail home from England, August 5.

Dr. Goldman had been a member of the Veterinary Association of the State of Berne (Switzerland).

**Charles W. Jackson** (STJ '21), 72, Iola, Kan., died at his home, July 19, 1959, after an extended illness.

Born at Scales Mound, Ill., Dr. Jackson had practiced in Colony, Kan., prior to moving his office to Iola in 1940. He retired in 1953.

★**Neil H. Myers** (OSU '25), 58, Wilmington, Ohio, died July 26, 1959, following a lingering illness.

A native of Wilmington, Dr. Myers had practiced there for the past 33 years; two of these years in partnership with his son Dr. Sidney A. (OSU '57).

Dr. Myers, in addition to belonging to several professional organizations, was active in civic matters. He had served for eight years as a member of the Wilmington Board of Education.

**James Franklin Pickett** (KCV '08), 77, Wichita, Kan., died July 17, 1959, after a lengthy illness.

Born in Ashton, Kan., Dr. Pickett had resided in Wichita most of his life.

**William Van Zoeren** (GR '10), 75, Vriesland, Mich., a practicing veterinarian for over half a century, died July 11, 1959.

Dr. Van Zoeren had conducted his practice in Vriesland ever since his graduation from the Grand Rapids Veterinary College.

• • •

**Other Deaths Reported.**—The following deaths have been reported. The usual information for an obituary was not supplied.

Wendell L. Finckard, Richmond, Va.  
F. L. Foster, Pico, Calif.

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SWINE**

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SURITAL sodium (thiamylal sodium, Parke-Davis) is supplied as follows: 0.5 Gm., 1.0 Gm., 5.0 Gm., and 10.0 Gm. ampoules (Nos. 263, 264, 265, 266); 1.0 Gm. Steri-Vials<sup>®</sup> (No. 64) (rubber-diaphragm-capped vials); 1.0 Gm. Steri-Vials (No. 64) with Diluent; 5.0 Gm. and 10.0 Gm. Steri-Vials (Nos. 122 and 123).



Department of Veterinary Medicine  
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**Indications:** For treatment of bovine mastitis caused by *Staphylococcus aureus*; *Streptococcus agalactiae* and *dysgalactiae*; *Escherichia coli* and *Pseudomonas aeruginosa* sensitive to Furacin.

**SUPPLIED:** A crystalline suspension of Furacin 2% and procaine penicillin G (13,333 units per cc.) in peanut oil with aluminum stearate 3%. In rubber-capped vial of 100 cc.; applicator tube of 7.5 cc., box of 12.

1. Kakavas, J. C., et al.: J. Am. Vet. M. Ass. 119:203 (Sept.) 1951.



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## What Is Your Diagnosis?

Because of the interest in veterinary radiology, a case history and radiographs depicting a diagnostic problem are usually published in each issue.

**Make your diagnosis from the picture below—then turn the page ►**

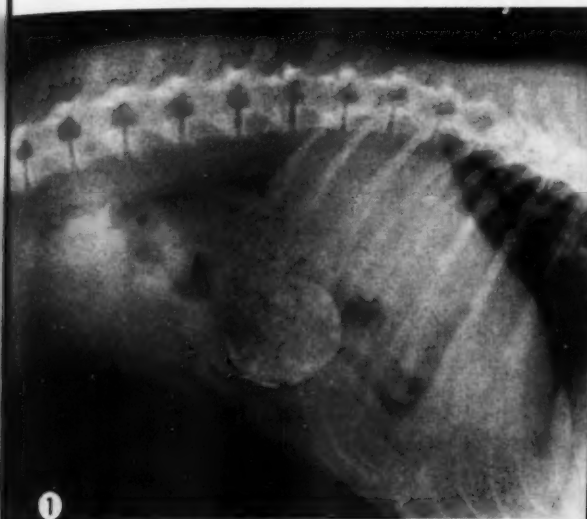


Fig. 1 and 2—Lateral recumbent and ventrodorsal radiographs of the Boston Terrier.



**History.**—A spayed female Boston Terrier, 2 years old, was affected with intermittent diarrhea for most of her life; this was accompanied by what the owner called "cramps." The owner was a hypochondriac so her complaints about the dog, for the most part, were ignored because the dog had always appeared to be in good health. However, on this occasion the dog was straining and in great distress but had no fever. The abdominal muscles were tense and a tender mass, estimated to be about 3.5 cm. in diameter, could be palpated in the abdominal cavity at the rib margin. Lateral recumbent and ventrodorsal radiographs (fig. 1 and 2) were taken.

## Here Is the Diagnosis

(Continued from preceding page)

*Diagnosis.*—A well demarcated mass situated near the midline and between the distal extremities of the last three ribs.

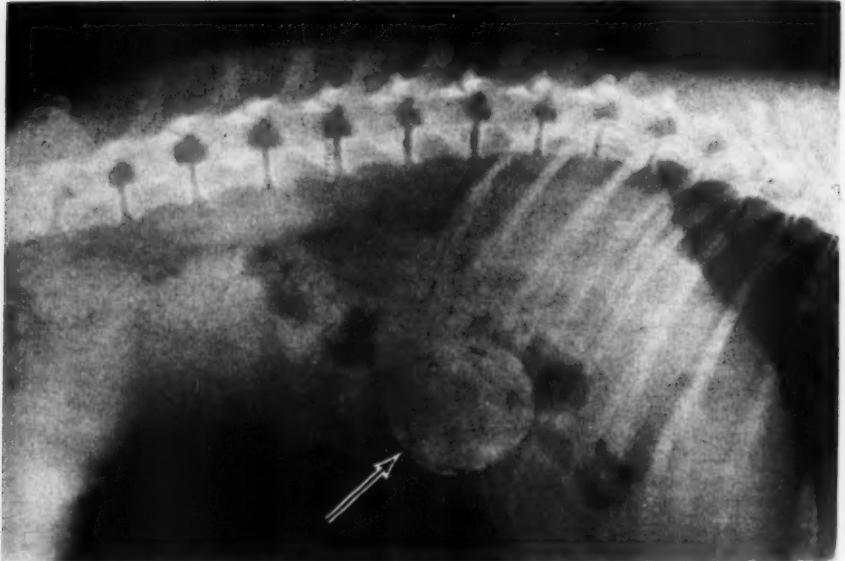


Fig. 3—Lateral radiograph of Boston Terrier showing mass (arrow) in abdominal cavity.

*Comment.*—A laparotomy examination revealed a smooth, rather firm, pedunculated sacculation covered with peritoneum and attached to the ileum 25 cm. anterior to the ileocecal junction. The mass was free and movable except for a stalk which attached it to the side of the bowel. The pedicle, when incised at the bowel wall, was found to communicate with the ileum. The opening was closed with sutures and no other abnormalities were found. Recovery was satisfactory.

The appendage was cystic and measured 5 cm. in length. Microscopically, the cyst wall was similar to and continuous with the intestinal wall. In man, this lesion is called a "Meckel's diverticulum." Such lesions are probably rare in the dog.

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This report was submitted by W. H. Crago, D.V.M., Youngstown, Ohio.

Our readers are invited to submit histories, radiographs, and diagnoses of interesting cases which are suitable for publication.

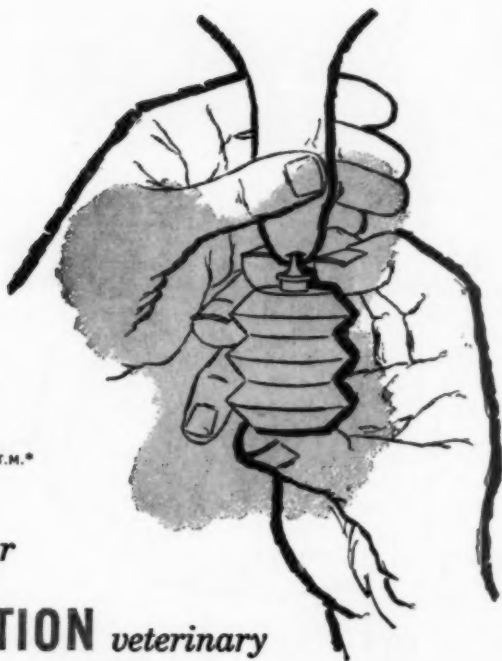
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dry and lactating cows

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- is discarded after using
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- unique package

\*design patented

FURACIN has been shown to be strikingly effective in controlling mastitis under field conditions.<sup>1,2</sup> Of 7,123 lactating cows with acute mastitis, fair to excellent results were obtained in 5,597 (78%). Of 3,418 dry cows which had had mastitis during their previous lactating period, fair to excellent results were obtained in 3,104 (90%).

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1. Mires, M. H., and Chadwick, R. H.: Vet. News 10:3 (Jan.-Feb.) 1947. 2. Mires, M. H.: J. Am. Vet. M. Ass. 117:49 (July) 1950.

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—as well as other conditions where the integrity of the vascular bed is impaired.

*In recommended dosage there are no contraindications.*

For intramuscular injection. Each 5 cc. vial contains adrenochrome isonicotinic acid hydrazone, 25 mg., present as sodium 3 hydroxy 2 naphthoate complex. Diluent: water USP, 5 cc., benzyl alcohol, 2% W/V.

**RECOMMENDED DOSAGE:** Small animals, 0.25 cc. to 1 cc.  
Foals, 2 cc.; Horses, 5 cc.

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## History of the AVMA

The meetings for 1871 were held at Young's Hotel in Boston and at the New York College of Veterinary Surgeons. The eligibility of candidates for membership was discussed, and Peter Nostrand was admitted as a member.

1871

Drs. Stein, Percy, and Weisse, members of the faculty of the New York College of Veterinary Surgeons, and Fred L. Thayer, M.D., were elected to honorary membership.

A resolution was adopted and a copy sent to the trustees of the New York College of Veterinary Surgeons: "That the U.S.V.M. Association request the Trustees of the N.Y.C.V.S. to have an examination of students before admission to the course of lectures, of such a nature as may seem to them to further the object of a higher grade of education."

This appears to have been the first of a continuing series of efforts of the Association to improve the caliber of veterinary instruction. In view of the later dissatisfaction that arose concerning the status of the N.Y.C.V.S., it would seem that this resolution had little effect at the time, but there is little doubt that the Association watchfully anticipated and promoted many of the improvements in the system of veterinary education.

It is of some significance that at the organization meeting two papers on veterinary education were read, and at the meeting in 1864, the Committee on Education was appointed. This committee seems to be the only one with an unbroken tenure throughout the years.

Elected as officers for the coming year were: A. Large of New York, president; William Saunders of Massachusetts, vice-president; J. L. Robertson, secretary; and Charles Burden, treasurer, both of whom were from New York. The incumbent slate of censors was re-elected.

A. LARGE, M.D., M.R.C.V.S., seventh president of the U.S.V.M.A., was educated at the London Veterinary College, and had returned to the United States only a short time before the organization meeting of the U.S.V.M.A. in 1863. Shortly afterward, he earned his M.D. degree at the Long Island Medical College, and took charge of the practice of his uncle, Dr. R. H. Curtis, who had adopted Large as his legal son.

After A. S. Copeman resigned as professor of theory and practice at the N.Y.C.V.S., Large was appointed his successor, and he continued in this position at the American Veterinary College for several years after this institution was established by its secession from the

N.Y.C.V.S. in 1875. He was one of the first to make the diagnosis of cerebrospinal meningitis in horses on Long Island, and wrote several articles on the subject for the *Veterinarian* (London).

A contemporary states: "Dr. Large was a fluent speaker, a thorough physician, master veterinarian, and superior teacher . . . . When he held his professorship, Large idolized the veterinary profession . . . .

In later years, for some unknown reason . . . . he took a great dislike, if not of the profession itself, at least to the connections it imposed on him, and he left Brooklyn for Massachusetts, where . . . he retired and established himself into consulting human practice."

★ ★ ★

ISAIAH MICHENER, V.S., was born in 1812, and for many years was the acknowledged patriarch of the American veterinary profession, but for some unaccountable reason he was never accorded the highest office of the Association. Few, however, were more active for a longer period than he. A member of the Committee on Organization in 1863, it was he who gave the Association its name, and he served variously as vice-president, corresponding secretary, censor, and as a member of several committees.

For a number of years, Dr. Michener and his son served side by side as officers in the Association, and he lived to see Charles elected its president.

In his seventies he was honored at the 1891 meeting as "one having served fifty and more years in the everyday work of the profession, in the hard and laborious duties of a rural practice . . . honored and revered by all his profession." He outlived his son Charles, and he died in June, 1899, after having served more than 60 active years in the veterinary profession.

Dog ward, New York College of Veterinary Surgeons, about 1870.





# Public Relations

## State and Local Activity

### Grass Roots Public Relations

In 1957, a survey by the AVMA Public Relations Department indicated that 39 per cent of the 63 AVMA constituent associations had public relations committees. Two states, Minnesota and Florida, had employed public relations counselling agencies.

Less than four per cent of 214 local associations, however, had public relations committees. This is the area of closest contact between organized veterinary medicine and the public, and it was the weakest.

By July of 1959, 48 (76%) AVMA constituents have named public relations committees and many more local associations are forming. Of these county or city associations, 51 have public relations committees, which is approximately 25 per cent of the total.

Nine states and two county veterinary organizations employ outside counsel. Three states which at one time employed an outside agency have discontinued their services—Florida is one of these.

A monthly publication of the AVMA, *Veterinary PR Roundup*, is circulated to the chairmen of these committees with copies for the members of the committee, to members of the AVMA Executive Board, public relations committee members of the Women's Auxiliary, and secretaries of those associations which do not have appointed committees.

The public relations department outlines and suggests programs for these associations, and publishes reports of successful activities from these associations. The Women's Auxiliary plays a vital role in this chain of communication by periodically mailing in clippings demonstrating grass roots activity.

The *PR Roundup* has also carried the comments made by newsmen interviewed by an independent organization (Gardner, Jones & Cowell, Chicago). These comments indicated a desire for veterinary information, but from a source close at hand. The facts gleaned in this personal interview series with 83 farm newsmen all over the United States, was corroborated by questionnaires mailed by the AVMA and a check of clippings from a professional clipping service (Luce).

Many state and local associations have conducted excellent programs.

The Georgia V.M.A. publishes six newsletters a year containing animal health information written for livestock owners. Members of the association submit a list of their clients to the public relations committee. Duplication of names are omitted, and the newsletter is mailed directly to the client, through the courtesy of his local veterinarian and the association. The veterinarian pays a nominal sum for the service. Georgia has graciously extended this service to Florida veterinarians.

The Colorado V.M.A. has assigned a group of 50 veterinarians to contact members of the press blanketing the state. The state association's public relations counselor provides this force with information pertinent to the livestock economy of the state.

The New York V.M.A. has prepared three slide talks for use by their members before farm groups, lay groups, and youth groups.

California has established a speaker's bureau of 60 veterinarians who are prepared to talk on various subjects pertaining to veterinary medicine before lay groups.

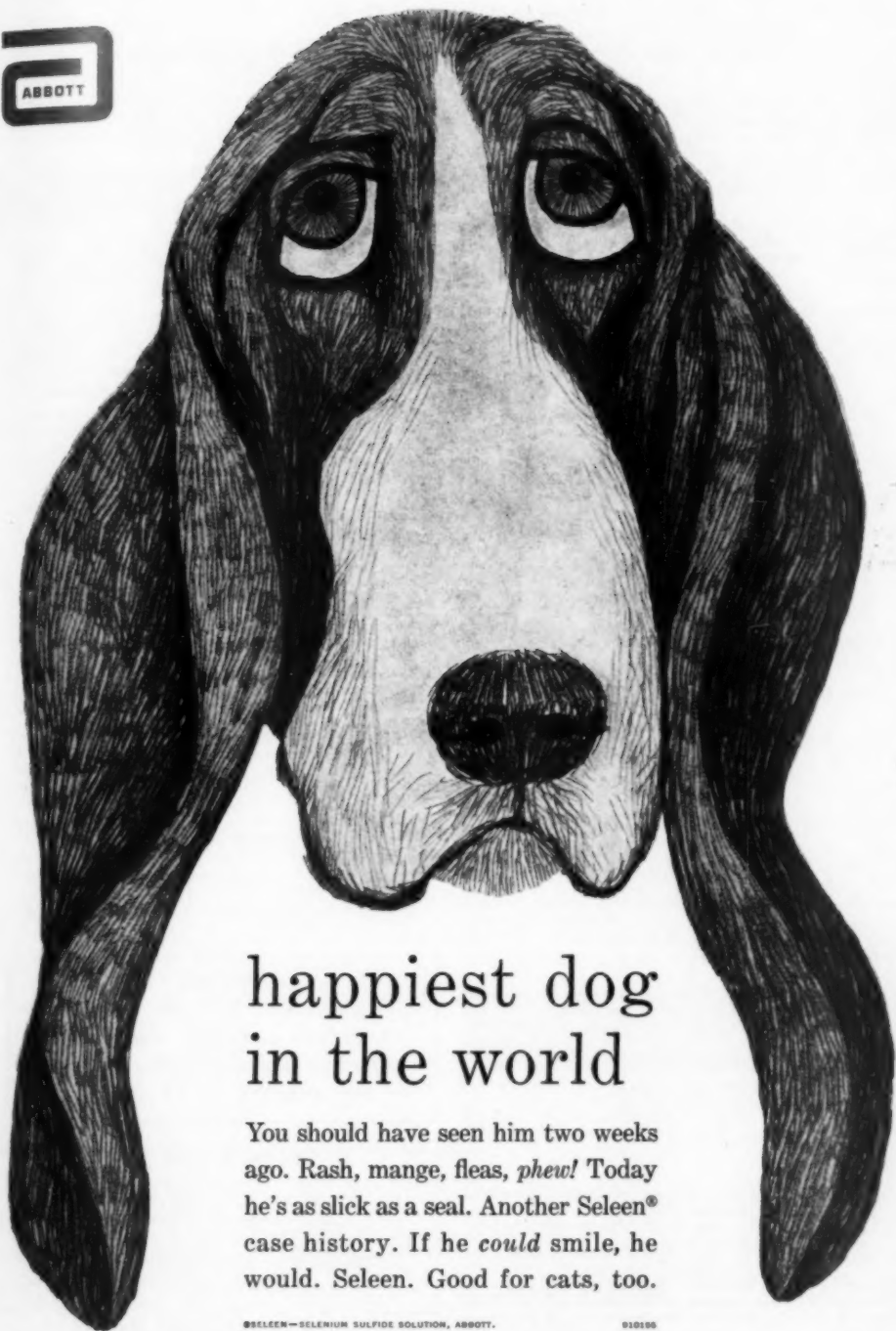
Many states and provinces have developed exhibits for use at public fairs and state fairs. Alberta, Ontario, California, Virginia, and many other state and local associations have made excellent use of AVMA radio interview scripts, supplemented with their own material.

The Seattle, Detroit, and Chicago local associations have held animal hospital open houses. The Denver V.M.A. conducts pet care classes in Denver public schools. In Clark County, Ohio, veterinarians award a rotating-type trophy to top youngsters who have 4-H and F.F.A. livestock projects.

Interprofessional councils, veterinary-nutrition conferences, animal health forums, and rabies clinics are among the activities of many associations at both state and local levels.

Many of these committees have developed excellent programs geared to the needs of their association within the area it serves. In some cases, they have incorporated AVMA speaker's kits, booklets, radio scripts, and films into their program. In many cases, the needs of a number of associations are similar, and the AVMA has developed material which is available to all.

This phase of the AVMA public relations program has shown encouraging results in a short time and will be expanded. When your association forms a public relations committee, take advantage of the AVMA speaker's kits on mastitis, veterinary medical careers, rabies, and veterinary-feed relations. Use AVMA booklets and films to reach your clients, and radio scripts to pass on animal health information. See what other public relations committees are doing in the *Veterinary PR Roundup*, and let them know what you are doing.



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## COMING MEETINGS

Notices of coming meetings must be received 30 days before date of publication.

Southern and West Virginia Veterinary Medical Associations. Combined meeting. Lord Baltimore Hotel, Baltimore, Md., Nov. 1-4, 1959. A. A. Husman, P. O. Box 91, Raleigh, N. Car., secretary, Southern V.M.A., and H. J. Fallon, 200 5th St., W. Huntington, W. Va., secretary, West Virginia V.M.A.

Missouri, University of. Thirty-fifth annual veterinary conference. University of Missouri, School of Veterinary Medicine, Columbia, Nov. 2-3, 1959. Cecil Elder, chairman.

Mississippi Valley Veterinary Medical Association. Annual meeting. Hotel Pèr Marquette, Peoria, Ill., Nov. 4-5, 1959. W. Paul Hendren, 417 N. Adams St., Carthage, Ill., secretary-treasurer.

New England Veterinary Medical Association, the Massachusetts Veterinary Association, and Region I of the American Animal Hospital Association. Combined meeting. Statler Hilton Hotel, Boston, Mass., Nov. 7-11, 1959. Dr. Frederick G. Ruder, Jr., 300 N. Pleasant St., Amherst, Mass., president, New England V.M.A. and Massachusetts V.A.

Midwest Small Animal Association and the American Animal Hospital Association. Regional meeting. Hotel Burlington, Burlington, Iowa, Nov. 11-12, 1959. J. Porter Coble, 2828 S. MacArthur Blvd., Springfield, Ill., secretary-treasurer.

National Swine Industry Conference. Second annual meeting. Iowa State University, Ames, Nov. 19-20, 1959. J. Russell Ives, American Meat Institute, 59 East Van Buren St., Chicago 5, Ill., conference secretary.

Midwest Feed Manufacturers' Association. Second conference. Kansas City, Mo., Nov. 30-Dec. 1, 1959.

Veterinary-Nutrition Conference. Second annual meeting. President Hotel, Kansas City, Mo., Nov. 30-Dec. 1, 1959. This conference is sponsored jointly by the Iowa, Kansas, Missouri, and Nebraska Veterinary Medical Associations and the Midwest Feed Manufacturers' Association.

Nebraska Veterinary Medical Association. Winter meeting. Cornhusker Hotel, Lincoln, Neb., Dec. 1-3, 1959. Dr. H. E. Hedlund, 403 N. Broadway, Wahoo, program chairman.

Arizona State Veterinary Medical Association. Annual meeting. Rancho Grande Hotel, Nogales, Ariz., Dec. 6-8, 1959. J. D. McCullough, 702 Yale Dr., Tucson, correspondent.

National Association of Federal Veterinarians. Forty-second annual meeting. Sheraton-Palace Hotel, San Francisco, Calif., Dec. 14, 1959, at 7:30 p.m. L. T. Hopkins, 5837 Highland Ave., Kansas City 4, Mo., secretary-treasurer.

United States Livestock Sanitary Association. Sixty-third annual meeting. Sheraton-Palace Hotel, San Francisco, Calif., Dec. 15-18, 1959. R. A. Hendershott, 33 Oak Lane, Trenton, N.J., secretary.

Kansas Veterinary Medical Association. Fifty-sixth annual convention. Hotel Broadview, Wichita, Jan. 10-12, 1960. Melvin W. Osburn, 1525 Humboldt, Manhattan, Kan., secretary.

Michigan State University. Thirty-seventh annual postgraduate conference for veterinarians. College of Veterinary Medicine, Michigan State University, East Lansing, Jan. 20-21, 1960. W. W. Armistead, dean.

Indiana Veterinary Medical Association. Seventy-sixth annual convention. Hotel Severin, Indianapolis, Ind., Jan. 13-15, 1960. L. M. Borst, 3315 Shelby, Indianapolis, secretary.

Intermountain Veterinary Medical Association. Annual meeting. Hotel Utah, Salt Lake City, Jan. 21-23, 1960. For information contact: Dr. Douglas H. McKelvie, 1220 South State St., Salt Lake City, Utah, or Dr. R. A. Bagley, 4600 Creek View Dr., Murray, Utah.

Minnesota State Veterinary Medical Society. Annual meeting. Hotel St. Paul, St. Paul, Minn., Jan. 25-27, 1960. B. S. Pomeroy, University of Minnesota, College of Veterinary Medicine, St. Paul 1, Minn., secretary.

Louisiana State University. Twenty-ninth annual short course for veterinarians. Plessant Hall, Louisiana State University campus, Baton Rouge, Jan. 26-27, 1960. R. B. Lank, Department of Veterinary Science, Louisiana State University, chairman.

Ohio State Veterinary Medical Association. Annual meeting. Deshler-Hilton Hotel, Columbus, Jan. 31-Feb. 3, 1960. R. E. Rebrassier, 1411 West Third Ave., Columbus 12, Ohio, executive secretary.

Oklahoma Veterinary Medical Association. Forty-fifth annual meeting. Biltmore Hotel, Oklahoma City, Feb. 1-2, 1960. J. B. Corcoran, P.O. Box 652, Stillwater, Okla., president.

California Veterinary Medical Association. Midwinter conference. University of California, Davis, Feb. 1-3, 1960. Mr. Kenneth Humphreys, 3004 16th St., San Francisco 3, Calif., executive secretary.

Colorado State University. Twenty-first annual conference for veterinarians. Glover Veterinary Hospital, College of Veterinary Medicine, Colorado State University, Fort Collins, Feb. 15-17, 1960. O. R. Adams, program chairman.

## Foreign Meetings

International Association of Veterinary Food Hygienists. Second Symposium. Basel, Switzerland, May 15-21, 1960. Dr. A. Clarenburg, 1, Sterrenbos, Utrecht, The Netherlands, president.

## NOTICE

*Publication of the regularly scheduled meetings will be resumed in the November 15 issue of the Journal.*

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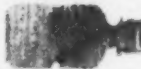
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## More AVMA Convention Highlights

### Registration

A total of 4,191 persons registered their attendance at the joint meeting of the Third Pan American Congress of Veterinary Medicine and the Ninety-Sixth Annual AVMA Convention, Aug. 23-27, 1959, in Kansas City, Mo.

### Summary of Registered Attendance

Classification	Number	Percentage of total attendance
Veterinarians	2,211	52.8
Women	878	21.0
Exhibitor		
Representatives	594	14.2
Children	322	7.7
Veterinary		
Students	117	2.7
Guests	69	1.6
	4,191	100.0

The five states with the highest number of registrants were: Missouri, 798; Kansas, 471; Iowa, 344; Illinois, 332; Texas, 159.

This was the largest convention, attendance-wise, ever held by the AVMA. Two factors which contributed to this were the central location of the convention city and the fact that the meeting was held jointly with the Third Pan American Congress of Veterinary Medicine. Of the 4,191 persons registered, 67 were from Pan American Countries; 65 from other foreign countries.

The AVMA House of Delegates in session during the Ninety-Sixth annual meeting in Kansas City, Mo., August 23-27.

### Regional Distribution of Registrants at the Kansas City Meeting — August 23-27, 1959

<b>NORTH ATLANTIC STATES</b>		South Carolina	9
Maine	5	Georgia	55
New Hampshire	1	Florida	47
Vermont	5	Subtotal	277
Massachusetts	14		
Rhode Island	3	<b>SOUTH CENTRAL</b>	
Connecticut	9	Kentucky	32
New York	87	Tennessee	36
New Jersey	62	Alabama	49
Pennsylvania	88	Mississippi	7
Subtotal	274	Arkansas	24
		Louisiana	29
<b>EAST NORTH CENTRAL</b>		Oklahoma	161
Ohio	120	Texas	159
Indiana	156	Subtotal	437
Illinois	332		
Michigan	77	<b>WESTERN</b>	
Wisconsin	91	Montana	12
Subtotal	776	Idaho	15
		Wyoming	16
<b>WEST NORTH CENTRAL</b>		Colorado	62
Minnesota	134	New Mexico	12
Iowa	344	Arizona	13
Missouri	798	Utah	16
North Dakota	28	Nevada	3
South Dakota	45	Washington	30
Nebraska	158	Oregon	13
Kansas	471	California	120
Subtotal	1,978	Alaska	1
		Hawaii	4
<b>SOUTH ATLANTIC</b>		Subtotal	317
Delaware	9		
Dix. of Columbia	46	<b>OTHER COUNTRIES</b>	
Maryland	46	Canada	28
Virginia	29	U. S. Possessions	7
West Virginia	10	Pan America	67
North Carolina	26	Foreign	30
		Subtotal	132
		<b>GRAND TOTAL</b>	4,191





Dr. W. H. Mowder (right) presents the AVMA golf trophy to Drs. John W. Pierce and E. H. Haynie, winners of the tournament with a low team score of 67.



### Winners of AVMA Golf Trophy

At the 1959 AVMA golf tournament, held at the Hillcrest Golf and Country Club in Kansas City, August 24, the AVMA trophy was won by Drs. John W. Pierce, Maryville, Mo., and E. H. Haynie, Kansas City, Mo., with a low team score of 67. The medalist prize was won by Dr. John W. Pierce, who was also awarded the Stader-Glenney Bowl.

Other winners were: in flight A—Dr. Andrew Vedros, Kansas City, Kan. (first); Dr. Martin H. Cadet, Wilmette, Ill., (second); and Major R. L. Hanson, Colorado Springs, Colo. (third); flight B—Dr. Alfred Coombs, Skowhegan, Maine (first); Drs. Dean Holder, Kansas City, Mo., and A. J. Rollag, Albuquerque, N. M., tied for second and third prizes. Flight C—Dr. Steve Kelly, Detroit, Mich. (first). The

prize for the low ball foursome was won by Drs. John W. Pierce, E. H. Haynie, L. T. Hopkins, and Richard D. Holder, all of Missouri, with a low team score of 65.

Mrs. Rose Roberts, of Ohio, was winner of the women's medalist prize, with a low gross score of 91. The exhibitors' prize was won by Dr. R. C. Hanson, Dodge City, Minn.

There were 82 participants in the tournament, 12 of whom were women.

### Conference of Editors

The Conference of Editors met in Room 364 in the Hotel Muehlebach, Kansas City, on Monday evening, Aug. 24, 1959. Approximately 60 editors and interested individuals attended.

Dr. Lester A. Dine, president of the Lester A. Dine Company, Woodside, N.J., discussed the "Techniques and Equipment Used in Modern Medical Photography."

He demonstrated cameras and light attachments

The Conference of Editors held during the AVMA convention.



which can be used to take pictures with excellent clinical detail. One camera of particular interest to the group was the Eastman Kodak Startec which is inexpensive and foolproof for close-ups of clinical subjects. It can also be adapted for long-distance takes.

Another recent development, which he demonstrated, was the Copycat, which makes possible instant black and white positives of color transparencies. He also showed a viewer-projector interchangeable unit which would serve as an excellent classroom tool as well as for use in the clinic.

In addition, Mr. Clarence J. Ellis, vice-president of the McWhirter Printing Company, Kansas City, discussed reasons for high printing costs and described some of the new processes which help to decrease costs and improve the quality of colored reproductions in publications.

## Reports of the Group Conferences Held During the Kansas City Meeting

### American Board of Veterinary Public Health

The annual meeting of the American Board of Veterinary Public Health was held on Aug. 24, 1959, in Room 362 of the Muehlebach Hotel in Kansas City. President Raymon Helvig presided. Thirty-three were present.

The session was limited to a business meeting because the Board considers itself a specialty and certification body; consequently, the presentation of technical or scientific papers would not be in keeping with its objectives.

Following the report of the president and secretary, Dr. H. J. Stafseth presented the highlights of the Institute on Veterinary Health Practice, which was held in October, 1958, under the auspices of the School of Public Health, University of Michigan. The Institute's editorial board is planning to have its "Proceedings" in publication within a short time.

Colonel Charles Snider summarized the meeting of the Second National Conference on World Health as the Board's representative at its meeting in Washington, D.C., May 7-9, 1959.

The purpose of the conference was to bring leaders in the congressional and executive branches of the federal government together with industries to discuss international health legislation and appraise the value of international health programs in developing habits of cooperation between nations and to outline the potentialities of a future international health year.

The committee on organization and functions of a specialty board made its report through Colonel Jack Hempy, chairman. This report, if adopted, will make radical changes in the constitution of the Board. These will be desirable, however, in helping to cope with the rapid advances being made in the specialty of public health.

Colonel W. E. Jennings, speaking as a representative of the AVMA Council on Education, presented a resume of the Association's committee on specialty boards in veterinary medicine. There will be an advisory board created which will consist of two representatives from each of the following: National Board of Veterinary Medical Examiners; Association of American Board of Examiners in Veterinary Medicine; Association of Deans of American Colleges of Veterinary Medicine; AVMA Council on Education; and also from each specialty board recognized by the AVMA.

The following officers were elected: Drs. Martin D. Baum, Denver, Colo., president; Stanley L. Hendricks, Des Moines, Iowa, vice-president; and Colonel C. H. Snider, Washington, D.C., secretary-treasurer.—*Martin D. Baum, President.*



### American Veterinary Radiology Society

The American Veterinary Radiology Society held its annual meeting in Room 362 at the Hotel Muehlebach, Kansas City, on Aug. 24, 1959. Sixty-five persons attended.

The Society held its mid-year meeting in conjunction with the Veterinary Medical Association of New Jersey at Princeton, N.J., in April, and held a regional meeting in Elkhart, Ind., September 20. The members also voted to repeat publication of the Society's "Proceedings."

The Kansas City program was as follows: Drs. N. B. Tennille, Stillwater, Okla.—evaluation of intravenous urography in the dog; W. C. Banks, College Station, Texas—value of radiographs in certain equine lamenesses; and D. Maksic, Urbana, Ill.—fracture and diseases of the sacrum in the dog and cat.

Major Robert B. Bailey, U. S. Army, San Antonio, Texas, spoke after the regular program on the German Shepherd Dogs that the Army is getting for sentinel duty. In his discussion, he advocated that a more uniform way of positioning for radiographs be adopted—a subject that will be treated extensively in the next issue of the "A.V.R.S. Proceedings" when it is published in the near future.

The following slate of officers were elected by unanimous ballot: Dr. W. H. Rhodes, Philadelphia, Pa., president; Myron Bernstein, Glencoe, Ill.—president-elect; Newton B. Tennille, Stillwater, Okla., vice-president; and J. J. Fishler, Elkhart, Ind., secretary-treasurer.—*J. J. Fishler, Secretary.*



### American Association of Equine Practitioners

More than 100 veterinarians attended the meeting held by the American Association of Equine Practitioners on Tuesday, Aug. 25, 1959, in Kansas City.

The program consisted of a report on Association activities by General Wayne O. Kester, A.A.E.P. president; a discussion on current problems in practice led by Dr. O. R. Adams of Colo-

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rado State University; and the introduction of Dr. Edwin A. Churchill, the A.A.E.P.'s past-president, as this year's recipient of the AVMA Practitioner's Research Award.

In addition, the Association used this opportunity to plan its fifth annual meeting which will be held at the LaSalle Hotel in Chicago, December 14-16.

Papers and panels on this program will include: pony practice; general equine practice; radiographic interpretation and diagnosis; leptospirosis; infectious anemia; breeding problems; nutrition; abdominal and general surgery; tendon surgery; regulatory and shipping problems, handling of equine insurance; rules governing veterinary practice at race tracks; some of the newer drugs in practice and several subjects yet to be determined.

The December meeting is open and the Association invites all veterinarians and students to attend.

Officers are: General W. O. Kester, Denver, Colo., president; Dr. Jordan Woodcock, Rye, N.Y., president-elect; and Dr. M. B. Teigland, Opa Locka, Fla.—secretary-treasurer.—*Wayne O. Kester, President.*

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## Industrial Veterinarians' Association

The fifth annual meeting of the Industrial Veterinarians' Association was held on Aug. 24, 1959, in the Trianon Room of the Hotel Muehlebach in Kansas City.

The program was as follows: Mr. Dal Bruner, executive secretary, Animal Health Institute, and Dr. Robert Burkhart, non-biological committee, member of the Pharmaceutical Manufacturer's Association—general discussion on new drug application requirements; Dr. L. Meyer Jones, Iowa State University—formation of a new AVMA council on biologics and therapeutic agents; and Dr. Joseph Fell, Warner-Chilcott Laboratories—a report on veterinarians in industry.

Officers elected for the coming year are: Drs. Frank Gossett, Greenfield, Ind., president; Donald Rankin, E. R. Squibb & Sons, president-elect; Charles W. Darby, St. Louis, Mo., secretary; and O. H. Siegmund, Rahway, N.J., treasurer.—*Ross G. Brown, Secretary.*

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## American Society of Veterinary Physiologists and Pharmacologists

The annual meeting of the American Society of Veterinary Physiologists and Pharmacologists was held at the Department of Physiology, School of Veterinary Medicine, Kansas State University, in Manhattan, Aug. 20-21, 1959.

The meeting was well attended with most of the 20 veterinary colleges in the United States and Canada represented.

The E. and M. Instrument Company, Houston, Texas, and the Glass Company of Quincy, Mass., had electronic biophysical equipment on display which was demonstrated, viewed, and studied with much interest.

Talks were presented on the following subjects: some aspects of rumen microbiology; rumen metabolism and legume bloat; research in rumenology; employment of radioisotopes in physiology and pharmacology; choice of counting equipment in biological tracer research; physiology of the mammalian transplanted kidney; magnetic blood flow meters; and demonstration of the polygraph.

Eleven individuals were elected to membership in the Society. Doctors N. H. Booth and Donald Will, both of Colorado State University, were elected president and secretary-treasurer respectively, for 1959-1960.

The Society's 1960 meeting will be held in Fort Collins, Colo., in conjunction with the AVMA's Ninety-Seventh Annual Convention in Denver.—*G. K. L. Underbjerg, Correspondent.*



### Association of Deans of American Colleges of Veterinary Medicine

The Association of Deans of American Colleges of Veterinary Medicine convened on Sunday, Aug. 23, 1959, in Kansas City, with all of the 20 North American Colleges represented.

The members expressed their sorrow and regret at the deaths of Dean L. M. Hutchings of Purdue University and Dean-Emeritus George H. Hart of the University of California.

The Association used this opportunity to extend an invitation to the various deans of the colleges of veterinary medicine in Latin America to become associate members of the organization. While the invitation was initially given during the convention at the AVMA's Latin American dinner, a personal invitation in Spanish will also be sent to each dean in Latin America.

Subjects discussed included: means of providing needed information to the AVMA's Council on Education; publication of information on veterinary medical education by a congressional subcommittee; a workshop for extension veterinarians; material for publication on veterinary medicine similar to that released by a life insurance company; and activities of the committee on graduate study.

Two of the Association's officers were re-elected: Drs. E. E. Leasure, president, and A. H. Groth, secretary-treasurer. Dr. W. T. S. Thorp was chosen vice-president. Recognition was extended to Dean-Emeritus W. A. Hagan of Cornell University for his distinguished service to the Association and to the profession as a whole.—*A. H. Groth, Secretary.*



### American Association of Veterinary Nutritionists

The annual meeting of the American Association of Veterinary Nutritionists was held at the Hotel Muehlebach, Kansas City, on Monday evening, Aug. 24, 1959.

Dr. Cunkleman opened the meeting with a re-

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# Ethical

view of the Association's objectives and of the correspondence the Association has conducted with the AVMA, regarding veterinary-feed industry relations. He indicated a nation-wide interest in joint committees and meetings to secure improvement in relations with the feed industry and also pointed to the increased number of positions in industry which are available to veterinarians.

Reports were then heard from the following committees: public relations; editorial; publications; and membership.

A most interesting and enthusiastic discussion of ethical veterinary-feed industry relations was held to assist the A.A.V.N. public relations committee in its reply to a request of the AVMA for help in defining policy in this general area.

Current officers of the organization are: Drs. Raymond C. Klussendorf, Terre Haute, Ind., president; Roy E. Nichols, University of Wisconsin, Madison, president-elect; and Charles G. Durbin, College Park, Md., secretary-treasurer.—R. E. Nichols, President-Elect.



#### National Association of Extension Veterinarians

The National Association of Extension Veterinarians met in Parlor B at the Hotel Muehlebach, Kansas City, on Monday, Aug. 24, 1959. Twenty-three extension veterinarians attended.

Most of this meeting in Kansas City was devoted to planning the agenda for the Association's workshop in Washington, D.C., which was held September 21-25. [A report of this workshop meeting will be published in a later edition.—Ed.]

Dr. Wayne Burch, extension veterinarian of Wisconsin, is acting secretary of the Association.—John B. Herrick, Correspondent.



#### Zoo Veterinarians

The annual Zoo Veterinarians' meeting was called to order by the chairman, Dr. Warner P. Heuschele, with 19 veterinarians in attendance, on Monday evening, Aug. 24, 1959.

Case reports regarding recent experiences in their various zoo practices were presented by Drs. Fisher, Williamson, Heuschele, and Gandal. There then followed a general discussion and a question and answer period, on the subject matter presented.

At the business meeting, the membership decided that too many in the group were not actively participating in the Association's affairs and Drs. O'Connor, Heuschele, and Gandal were appointed as an advisory board to look into the more formal organization of the Zoo Veterinarians' group and to set up a series of bylaws and membership requirements.

Due to this study, the board may suggest that the dues for the coming year (calendar year, 1960) should be raised to \$2.00 and that all members be required to furnish at least one case report (for circulation), regarding their treatment of other than domestic animals.

At the close of the meeting, Dr. Fisher introduced Dr. Pickett who spoke of his experiences in capturing and caring for gorillas and the many problems involved in successfully transporting and caring for these extremely delicate animals.—*Charles P. Gandal, Secretary.*



### Women's Veterinary Medical Association

Four members were present at the annual meeting of the Women's Veterinary Medical Association at the Hotel Muehlebach, in Kansas City, Aug. 24, 1959.

The selection of Gabriele Sonnteg Levine, University of California, as the W.V.M.A. Award winner was approved. This Award was given for the first time to the graduating senior veterinary student with the highest average. Increased to \$100, the Award will also include an appropriate certificate.

The treasurer's report was presented and approved. Noting the large expense for refreshments at the 1958 meeting, the members present suggested that the Association might consider better ways to spend its money. It will be noted that there will be no expense for the 1959 meeting.

The possibility of giving more than one award was suggested. An additional \$100 was also contributed to the Women's Auxiliary Loan Fund.

It was proposed that the \$1,000 of the bank balance be transferred to a savings account, pending new directory costs.—*Lois Calhoun, Recorder.*



### National Board of Veterinary Medical Examiners

The annual meeting of the National Board of Veterinary Medical Examiners was held at the Hotel Muehlebach, Kansas City, Mo., Aug. 25, 1959. President C. W. Bower presiding. Twenty-five of

the 31 members were present or represented by proxy; several members of state examining boards were also present.

Dr. Lillian D. Long, director of the Professional Examination Service, which collaborates with the National Board in formulating and furnishing objective tests to state veterinary examining boards, presented a report on the use of these tests in 1959. Their growing use is reflected in the following figures:

	No. of Boards	Candidates Examined
1924	9	210
1955	8	501
1956	11	598
1957	14	681
1958	19	907
1959	22	971

Since 1954, a total of 3,868 candidates for veterinary licensure have been examined by the objective test method in so far as the written part of the examination process is concerned. In 1959, the Boards using the tests were those in Alabama, Arkansas, California, Colorado, Connecticut, District of Columbia, Idaho, Indiana, Kansas, Maryland, Massachusetts, Minnesota, Montana, Ohio, Oklahoma, Oregon, Pennsylvania, South Carolina, South Dakota, Utah, Washington, and West Virginia.

*Interstate Reporting Service Proposal Approved*—One of the major items on the agenda was action on the proposal for an "interstate reporting service," a draft of which had been prepared and circulated to Board members for study as suggested at the 1958 meeting.

The proposal was unanimously approved and will be sent to state boards using the National Board-P.E.S. tests to determine their interest in it and their willingness to place information about it in the hands of candidates for licensure next year. If a sufficiently favorable response is received

Of the 19 alumni groups which met for dinner on Tuesday evening, the largest was that of Kansas City Veterinary College, which last graduated a class in 1918, with 771 in attendance. A special guest of the group was Miss Fanny Smith who served as secretary of the dean of the college in 1918.





from the state examining boards, the service will function in 1960.

The objective of the proposed reporting service is to reduce or make unnecessary the repeated written examination of candidates who seek licensure in more than one state using the National Board-P.E.S. tests. The service would function by setting up permanent record files of the initial scores made by candidates; these scores would then be reported, at the request of candidates, to other state boards using the tests as part of their licensing procedure.

Participation in the service would be voluntary on the part of candidates who would pay a nominal fee for it; acceptance of the reported scores would also be at the discretion of the respective examining boards who would retain, as they now do, full control of licensure by the oral and practical tests which they employ, in addition to the written objective tests.

Dr. C. W. Bower was re-elected as president of the N.B.V.M.E. and Dr. H. E. Kingman, Jr., was elected secretary-treasurer.—J. G. Hardenbergh, *Secretary-Treasurer*.



#### National Society of Phi Zeta

The annual meeting of the National Society of Phi Zeta was held on Monday, Aug. 24, 1959, in the Muehlebach Hotel, Kansas City. A total of 19 members were in attendance with all except the Alpha, Delta, Epsilon, Iota, and Lambda Chapters represented by active members.

The Society received a report on the establishment of the thirteenth chapter, designated the Nu Chapter, at Oklahoma State University in October, 1958. Dr. R. A. Packer, president, made the formal installation.

In addition, announcement was made that a petition from the College of Veterinary Medicine, University of Georgia, Athens, for the establishment of a chapter at that school had received unanimous approval from the constituent chapters

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and formal initiation will be made this fall. This leaves only the veterinary colleges at Kansas State University, Tuskegee, University of Missouri, and Purdue University without formal representation in the Society.

A total of 231 new members were initiated into the Society by the thirteen constituent chapters during the 1959 initiation period. Of these, 218 were admitted to regular membership and 13 were admitted to honorary membership.

Other items on the Society's agenda were: discussions on the establishment of Phi Zeta lecture-ships; a constitutional amendment changing the date of eligibility for admission of undergraduate veterinary students to the Society; and a study of the Society's national constitution.

Dr. Alvin Weber of the Kappa Chapter was installed as president. He expressed the hope that the Society will continue to use and to perfect its resources in trying to attract more and better high school graduates into the profession, and also to utilize the full potential of veterinary science departments in institutions not having a veterinary college.

Other officers elected were: Drs. Donald C. Lee,

The AVMA-sponsored dinner for student chapter and auxiliary delegates was held Sunday evening, August 23, in the Phillips Hotel.



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Beta Chapter, University of Pennsylvania, president-elect (term of office: 1961-1963); Clarence Cole, Delta Chapter, Ohio State University, vice-president (term of office 1959-1961); George W. Mather, Kappa Chapter, University of Minnesota, secretary-treasurer (term of office 1959-1961).—*Jack J. Stockton, Secretary.*

### American Association of Veterinary Bacteriologists

The American Association of Veterinary Bacteriologists met in Room 200 of the Veterinary Medical Laboratory in the College of Veterinary Medicine at Iowa State University, Ames, on Saturday Aug. 22, 1959.

The Association's program included: Drs. J. C. Picken, Jr., Iowa State University—principles and application of gamma (ionizing) irradiation in microbiology; E. V. Morse, Iowa State University—report of the A.A.V.B.'s committee on leptospirosis diagnosis; R. A. Packer, Iowa State University—I.S.U.'s veterinary microbiology; S. L. Hendricks, Iowa State Department of Health, Des Moines—recent epizootics of staphylococcal food poisoning in Iowa; R. K. Lindorfer and P. Subramanyan, University of Minnesota—induced immunological unresponsiveness in rabbits to staphylococcal toxins; and K. Loken, University of Minnesota—studies on staphylococcal mastitis—characterization by phage typing and toxins.

The following veterinarians appeared on a panel concerned with graduate training: Drs. J. R. Col-

lier, Colorado State University; B. S. Pomeroy, University of Minnesota; C. H. Cunningham, Michigan State University; R. A. Bankowski, University of California; I. Live, University of Pennsylvania; E. H. Bohl, Ohio State University; L. Hanson, University of Illinois; and L. C. Grumbles, A. & M. College of Texas.

The Association's new roster for 1959-1960 is: Drs. E. V. Morse, president; J. O. Tucker, University of Wyoming, president-elect; and C. H. Cunningham, secretary-treasurer.

The University of Wyoming in Laramie, has been chosen as the 1960 site for the next meeting of the Association.—*C. H. Cunningham, Secretary.*



### National Veterinary Wholesalers Association, Inc.

The National Veterinary Wholesalers Association met with the major representatives of the manufacturers of veterinary products in the Convention Auditorium, at Kansas City, on Aug. 25, 1959.

The N.V.W.A., organized as a California corporation, is composed of independently owned and operated veterinary distributors who sell exclusively to the veterinary profession.

Mr. Guy Stephenson, president, explained the aims and functions of the Association and invited manufacturers interested in the field to join as associate members of the N.V.W.A.

The organization is composed of five regions covering the entire United States. The board of directors includes one representative from each region as follows: Dr. H. C. Burns, West; Mr. Herb Holms, North Central; Mr. Jack Miller, South Central; Mr. Guy Stephenson, North East; and Mr. Carl Sutton, South East.

Officers for 1959-1960, in addition to Mr. Stephenson, are: Mr. Carl Sutton, vice-president; and Mr. Jack Miller, treasurer.

George C. McConnell, P.O. Box 1527, Oakland, Calif., was appointed executive secretary.—*G. C. McConnell, Executive Secretary.*

## APPLICATIONS

### Applicants—Not Members of Constituent Associations

In accordance with paragraph (b) of Section 2, Article X, of the Administrative Bylaws, as revised at the annual meeting of the House of Representatives, Aug. 18, 1951, in Milwaukee, Wis., notice of all applications from applicants residing outside of the jurisdictional limits of the constituent associations, and members of the Armed Forces, shall be published in the JOURNAL for two successive months. The first notice shall give the applicant's full name, school, and year of graduation, post office address, and the names of his endorers.

CLEM, WESLEY A., Jr.

QM Subsistence School, Fort Lee, Va.

V.M.D., University of Pennsylvania, 1939.

Vouchers: F. D. Daughtrey and H. J. Robertson.

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**MAHAJAN, AJIT SINGH**

195 W. Eleventh Ave., Columbus 1, Ohio.  
L.V.P., Punjab Veterinary College, 1942.  
Vouchers: H. F. Groves and D. O. Jones.

**HWANG, JEN**

Dept. of Animal Diseases, University of Connecticut,  
Storrs, Conn.  
D.V.M., Army Veterinary College of China, 1940.  
Vouchers: Erwin Jungherr and C. F. Helmboldt.

**STONEBRAKER, ERNEST K.**

366 Park Avenue, Orange, N.J.  
D.V.M., Kansas State College, 1944.  
Vouchers: W. E. Jennings and M. W. Scothorn.

**FOLLING, BJARNE N.**

U.S. Army Hospital, Fort Jackson, S. Car.  
V.M.D., University of Pennsylvania, 1943.  
Vouchers: W. E. Jennings and M. W. Scothorn.

**THOMAS, ROY C.**

8 Country Club Dr., Glen Burnie, Md.  
D.V.M., Kansas State College, 1943.  
Vouchers: W. E. Jennings and M. W. Scothorn.

**PARKER, ROYCE C.**

Zone 9, Det. 25, Fifth US Army, VFIS, 601 Hardesty  
Ave., Kansas City 24, Mo.  
D.V.M., Alabama Polytechnic Institute, 1956.  
Vouchers: W. W. Fechner and W. E. Ketter.

**Reptile Mites Eradicated**

Snakes are frequently infested with mites that flourish in captivity. Although the mites are not native to this hemisphere, they reproduce rapidly and, in large numbers, can kill a snake, due to loss of blood, in as short a time as one day. Mites can live for months without food and thus remain a source of infestation long after a cage is emptied of snakes.

For treating mite infestation in both native and foreign snakes, either rotenone (0.75%) or pyrethrum powders in commercial preparations may be used. The powder is applied sparingly but thoroughly to cage floor and specimens and is reapplied only if mites reappear. This technique is simple and costs little in money or time. Certain snakes are sensitive to rotenone or pyrethrum in concentration, especially in solution. The dangers arising from this infrequent sensitivity can be eliminated by changing the water every three days.

—H. M. Smith at the *Symposium on Health of Small Animals*, Chicago, July, 1959.

**Notes on Eating Procedures**

Tests show that chickens eat much more during the first five minutes after being fed than during the following five minutes. When their hunger is satisfied, chickens eat according to their appetite.

Swine tend to eat as long as they get feed, but the intake per minute gradually decreases. For the first six or seven minutes, hogs take about 2 oz. bites, 10 to 13 times per minute, after which their bites are only half as large and are taken four to seven times per minute.—B. Tangel in *Die Vet-med.*, 12, (1959): 300.

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**FINE PHARMACEUTICALS**  
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The Veterinarians' Institution

**Travel Schedule for AVMA  
Officers and Staff**

(Dec. 14, 1959-April 3, 1960)

- Dec. 14-16, Chicago, Ill.—*American Association of Equine Practitioners*, S. F. Scheidy  
Dec. 17, Chicago, Ill.—*Group Insurance Trust*  
Dec. 14-18, San Francisco, Calif.—*U.S.L.S.A.*, J. R. Hay  
Jan. 10-12, Nashville, Tenn.—*Tennessee V.M.A.*, E. E. Leasure  
Jan. 10-12, Milwaukee, Wis.—*Wisconsin V.M.A.*, S. F. Scheidy  
Jan. 19-21, Des Moines, Iowa—Iowa V.M.A., D. J. Anderson  
Jan. 20-21, East Lansing, Mich.—*Postgraduate Conference for Veterinarians and Student Chapter*, S. F. Scheidy  
Jan. 22-24, White Sulphur Springs, W. Va.—*Greenbriar Conference*, S. F. Scheidy  
Jan. 25-27, St. Paul, Minn.—*Minnesota V.M.A.*, E. E. Leasure  
Jan. 27-29, Salt Lake City, Utah—I<sup>n</sup>termountain V.M.A., E. E. Leasure  
Feb. 1-3, Columbia, Missouri—*Council on Education*  
Feb. 1-3, Davis, Calif.—*Mid-Winter Conference*, S. F. Scheidy  
Feb. 4-6, Portland, Ore.—*Pacific-Northwest Associations Conference*, S. F. Scheidy  
Feb. 8-11, Washington, D. C.—*Livestock Advisory Committee*, H. E. Kingman, Jr.  
Feb. 15-17, Springfield, Ill.—*Illinois V.M.A.*, E. E. Leasure  
March 4-5, Chicago, Ill.—*Executive Board*

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## Additions to the AVMA Film Library

### Rabies Control in the Community

16mm. Sound	Black & White; Running time 11 min.	Produced by U.S. Public Health Service	Rental \$1.50
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The film shows human and canine cases of rabies and provides a short discussion of the signs of rabies in the dog. However, the differences between "furious" and "dumb" rabies is not clearly defined. Community action for the development of mass rabies immunization programs, control of stray dogs, and the needs for wildlife controls are stressed.

This film may be used before lay audiences, particularly service clubs and civic groups, in areas where rabies is a community problem. Professional groups will find this film to be elementary.

### Eye Surgery in the Dog—Parts I & II

16mm. Sound	Color; Running time Part I—18 min. Part II—17½ min.	Produced by Dr. Leonard Krawitz in Cooperation with School of Veterinary Medicine, University of Pennsylvania and Wyeth Laboratories	Rental \$2.50
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A practical demonstration of surgery of the eye in the dog. The film is in two parts. Part I deals with the surgical procedures for the following: Pterygium, entropion, pigmentation of the cornea, removal of growth and foreign bodies, decreasing pressure in anterior chamber of the eye, and removal of ulcers of the conjunctiva.

Part II describes enucleation of the eye and surgical intervention in cases of glaucoma.

This film is recommended for teaching of veterinary students and professional audiences. It is not recommended for lay viewing.

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**NEWPORT, KENTUCKY**

## Plum Island—Animal Disease Laboratory

16mm. Sound	Color; Running time 23 min.	Produced by U.S.D.A.	Rental \$2.50
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This film gives geographical location and detailed description of the physical plant of the Plum Island Animal Disease Research facilities. Most of the film is devoted to emphasizing the precautionary procedures in handling employees, animals, supplies, etc., to prevent the spread of any disease from the island.

Foot and mouth disease research is the principle theme of the film, and emphasizes the care which must be used to control viral and bacterial agents.

This film is recommended for professional and lay audiences.

## Films Available from Other Sources

### Metisteroids in Veterinary Medicine

16mm. Sound	Color; Running time 24 minutes	Produced by Campus Film Productions, New York 22, N. Y.	Available From Audio-Visual Dept., Schering Corp., Bloomfield, N.J.
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This film, advertising the company's products, claims benefits in many common disease conditions of large and small animals with emphasis on the importance of the "stress factor" in disease and the effect the adrenal hormones play in body function. Some of the conditions mentioned are: canine dermatitis, opacity of the cornea, arthritis, ketosis, mastitis, and keratitis. No effort is made to discuss some of the fundamental factors leading to the conditions mentioned.

Techniques in administration of intramuscular, subcutaneous, and intrammary injections are not performed in what is considered to be an acceptable manner.



## The "BIG 3" SERIES of CLIPPER BLADE

## GRINDERS

will save you time and money too!

Sun Ray's scientifically designed and engineered grinders assure you of blades correctly ground to professional sharpness every time.

Easy to Use. No previous experience or special skill necessary. Just remove blades from clipper . . . place on grinder — THAT'S ALL! Avoid waiting for blades. Save on periodic grinding costs.



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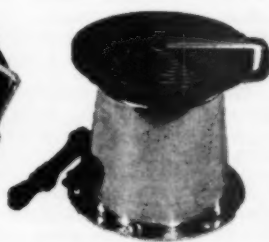
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**TOTAL WORD COUNT** must include complete box number address (7 words) or personal address line.

**COMMERCIAL WANT ADS**—\$5.00 for the first 25 words, 25 cents for each additional word; \$1.00 for use of box number. (See paragraph above for total word count.)

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### DEADLINES

1st of month issue — 6th of month preceding date of issue.

15th of month issue — 20th of month preceding date of issue.

*Names of classified advertisers using key letters can not be supplied. Address your reply to the box number, c/o JOURNAL of the AVMA, 600 S. Michigan Ave., Chicago 5, Ill., and it will be sent to the advertiser.*

### Wanted—Veterinarians

**Wanted**—assistant veterinarian for small animal practice in the St. Louis area. Good opportunity for the right man. Address Box P 35, JOURNAL of the AVMA.

**Assistant** in expanding small animal hospital. Profit sharing arrangement after first year. Florida license necessary. Address Box R 9, JOURNAL of the AVMA.

**Pharmacologist**—Ph.D. or D.V.M. with M.S. in pharmacology with experience or training in drug evaluation and pharmaceutical research and development. Send resume to Pharmaceutical Research Division, Norden Laboratories, Lincoln 1, Neb.

**Assistant**—small animal hospital, immediate suburb of Chicago. Position available January 1. Must have Illinois license by then. Replies confidential. Address Box S 1, JOURNAL of the AVMA.

**Wanted**—relief veterinarian, Maryland licensed. Approximately three weeks, around December 18. Address Box S 3, JOURNAL of the AVMA.

**Poultry pathologist wanted**—progressive eastern chemical corporation needs a man for poultry diagnostic laboratory and related technical service work. An excellent opportunity for advancement. Address Box S 6, JOURNAL of the AVMA.

**Postdoctorate fellowship** for graduate study—opportunity for veterinarian with interests in biochemistry research and cat metabolic studies. Conduct research studies under the director of research at Rutgers University. Contact Morris Animal Foundation, 510 Mile High Center, Denver 2, Colo.

**POSITION AVAILABLE** for new or recent graduate for combination diagnostic and research work mainly with poultry. National biological and pharmaceutical laboratory. Special training in histopathology desirous. Salary commensurate with background and ability. Please send information on personal and professional qualifications.

Address Box R 35  
JOURNAL of the AVMA.

**Wanted**—immediately. Two experienced graduate veterinarians for well-established mixed practice. New large and small animal clinic, complete facilities. Will consider salary, partnership, purchase, or commission basis. George R. Watson, D.V.M., Box 113, Kingman, Kan.

**Experienced** small animal veterinarian for hospital in Indiana. Must be efficient, capable, and industrious. Good salary and commission. Address Box S 9, JOURNAL of the AVMA.

**Veterinarian** to assist small animal practice; Virginia license required. In letter, state pertinent facts such as age, ability, experience, availability. Bonus arrangement. Address Box S 12, JOURNAL of the AVMA.

### Wanted—Positions

**Position** wanted in small, mixed, or large animal practice in southwestern, western, or midwestern U.S. Texas and Virginia license, married, complete military obligation March, 1960. Address Box R 30, JOURNAL of the AVMA.

**Graduate (OSU '58)** desires position in small animal hospital in Florida. Holds Florida license. Address Box R 39, JOURNAL of the AVMA.

**Senior** at midwestern school desires position with a future with predominantly small animal practitioner in Northeast. Address Box S 11, JOURNAL of the AVMA.

**Veterinarian**, age 28, with four years experience in his own general practice, desires position with commercial firm or institution. Exceptional background and references. Address Box S 13, JOURNAL of the AVMA.

### Wanted—Practices

**Two experienced veterinarians** are seeking to lease or buy small animal hospital in Chicago or suburbs. Address Box M 34, JOURNAL of the AVMA.

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<i>Neomycin sulfate</i>	. . . 0.25%
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**Supply:** 5 Gm., 14 Gm. and 30 Gm. plastic insufflators.

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Need small animal or mixed practice hospitals. Southwest practice and real estate broker. Charles E. Doyle, D.V.M., 5930 N.W. 39th, Oklahoma City, Okla.

Established dairy practice located in Wisconsin. Residence-office, drugs, equipment; with or without 2-way radio. Address Box R 24, JOURNAL of the AVMA.

For sale—Minnesota practice. Real estate. Address Box R 25, JOURNAL of the AVMA.

For sale—midwestern large animal practice, hogs and beef cattle, 20 per cent dairy. Home, hospital, drugs and equipment including cattle chute and new 2-way "private line" radio. Gross over \$50,000 per year for last three years. Price \$37,000. Minimum down payment \$7,500, will finance balance at six per cent. Reason for leaving: allergy. Address Box R 33, JOURNAL of the AVMA.

For lease, starting April 1, 1960—an established small animal hospital in central New Jersey. Excellent opportunity for industrious veterinarian. Living quarters are included. Address Box S 2, JOURNAL of the AVMA.

For sale or lease—small animal hospital, some dairy practice, Rhode Island. Excellent location, 97 cages, could support two veterinarians. Wonderful opportunity for ambitious young man or partnership. Will finance. Address Box S 4, JOURNAL of the AVMA.

For sale—well-established small animal practice in new hospital, 50 miles from New York City. Real estate, eight acres, business, and equipment: \$100,000. Terms, minimum cash \$25,000. Unlimited possibilities. Address Box S 5, JOURNAL of the AVMA.

For sale—large animal practice, southwestern Michigan, gross \$12,000. Unlimited possibilities, low investment. Owner leaving for partnership. Address Box S 7, JOURNAL of the AVMA.

For sale—mixed practice in eastern Ohio, completely equipped hospital. Escape-proof outside runs, modern apartment. Bertha M. Joseph, M.D., Martins Ferry, Ohio.

Small animal hospital and mixed practice in midwestern university medical school city, including \$500 monthly salaries. \$5,000 down; other interests. Address Box S 8, JOURNAL of the AVMA.

Florida hospital for sale or lease in large city on U.S. highway. Must have Florida license. Write for information. Address Box S 10, JOURNAL of the AVMA.

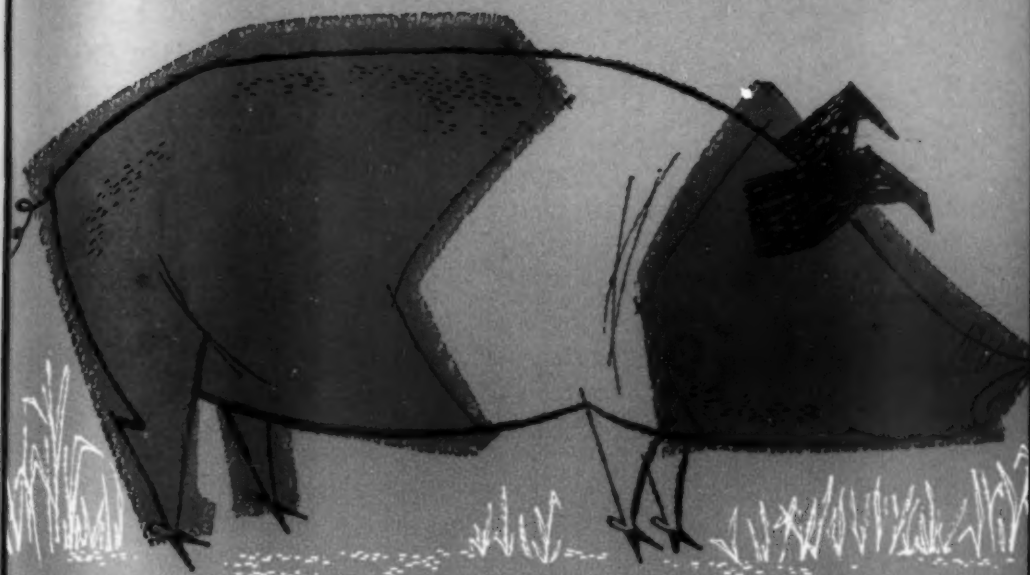
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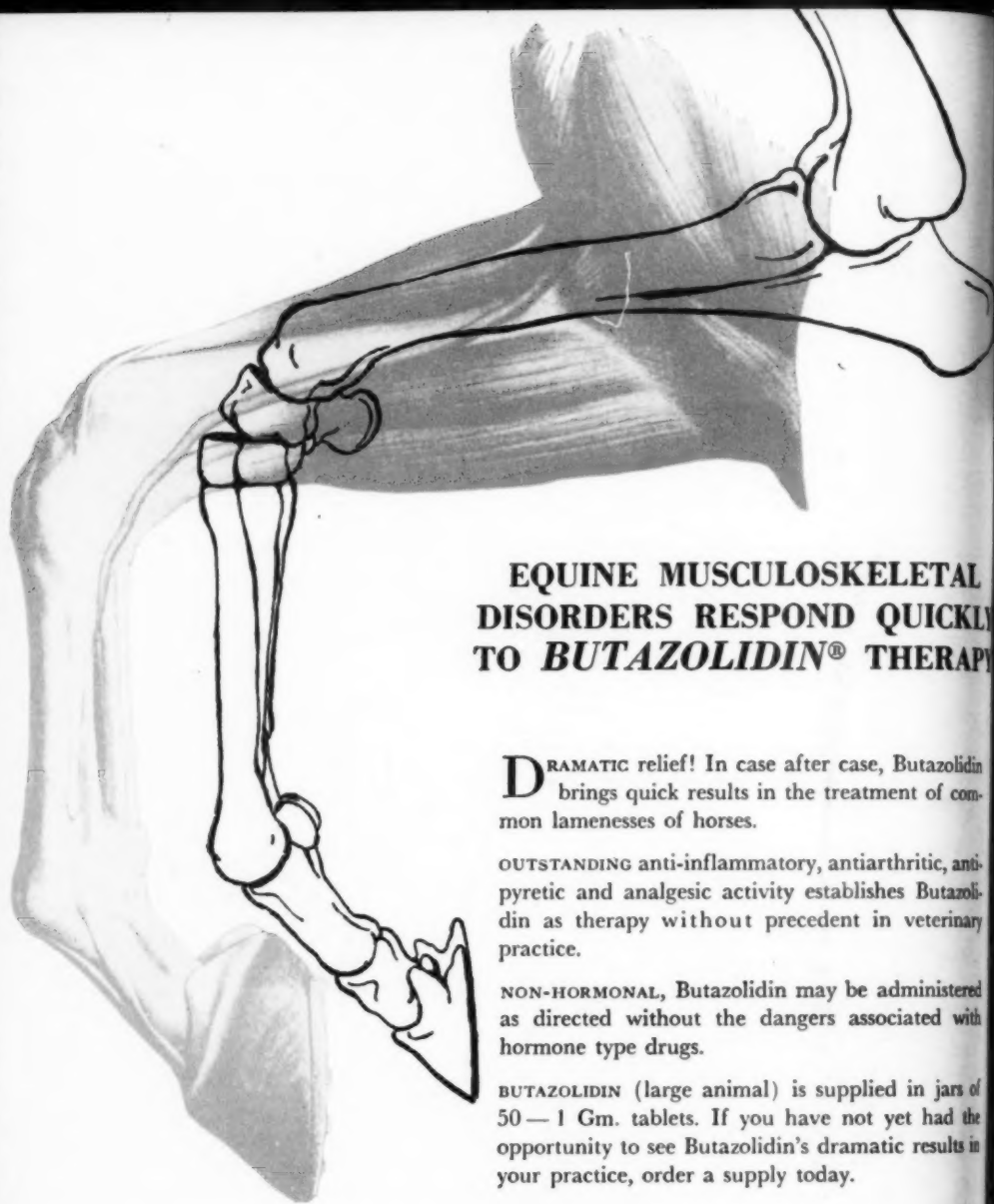
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